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What About Derailments?

SOME track men regard derailments, like the poor, as being always with us. In other words, they accept them as a matter of fact and give little thought to them unless they become abnormally frequent or involve unusual destruction of property or loss of life. Other roads, on the contrary, consider every derailment, no matter how minor, as one too many, and investigate it with care to determine its cause in order that it may be eliminated. One such road organizes a committee of representatives of the roadway, mechanical and transportation departments to investigate every derailment and insists that these men agree in fixing responsibility. Such action not only avoids the shifting of blame but also focuses attention on the importance of the individual accident and paves the way for the correction of the condition that caused it.

The first and most essential step in any campaign for the elimination of derailments is the development of a proper attitude toward this class of accidents. Once this attitude has been acquired, the study and analysis of this class of accidents will bring to light defective practices, designs and materials, and point the way to their correction. Without such study, on the other hand, the defective conditions continue indefinitely. Since the maintenance of way department is called upon to bear a large part of the responsibility for derailments, it behooves it to take the initiative in the study of this subject in order that defective practices within its control may be eliminated and that it may be relieved from responsibility for accidents beyond its control.

When Men Think

NEVER in the history of railroading in America have roadway officers taken a broader attitude toward their problems. There was a time when the advocate of any marked departure from current practice was dismissed as a crank or a novice who lacked the stabilizing influence of long practical experience. But in recent years, changes have taken place so rapidly that railway men, generally, are given to a critical study of many practices and policies of long standing. Thus, even the time-honored section gang is being placed on trial because some roadway officers consider it a barrier to the fullest application of labor-saving equipment.

But the marked trend toward mechanical appliances is not the only influence that has given rise to this critical attitude. The gradual improvement in the track structure, the longer average life of ties, current problems of rail maintenance, all lead to new questions. Is it economy to release ties from main tracks with a view to their use for the remainder of their service life in sidings? Will we come eventually to the European practice of "relaying" track (renewing it out of face)? These are some of the questions that are being asked by the thoughtful track man.

This free discussion of ideas that would have been deemed radical, if not silly, 10 years ago, is a healthy sign. It does not follow that all the suggestions are sound, but it shows that men are thinking and so long as they are doing that we may expect progress.

Co-operation Produces Results

ALMOST everything that is done by the construction and maintenance forces of a railway is in the nature of a service for some other department. The building forces are engaged in constructing and repairing stations, shops, offices, etc., to meet the requirements of various departments. The bridge and roadway forces must keep the bridges and tracks in such condition that the operating department can move trains over them effectively and safely. To fulfill these requirements, construction and maintenance forces must not only do their work well, but they must also maintain the necessary contact with the using departments, to insure thorough agreement as to the requirements and an amicable adjustment of misunderstandings.

In no phase of railway operation is this of greater importance than in the supplying of water of suitable quality for use in locomotive boilers. This is generally accepted as a responsibility of the engineering department, but defects in quality have a vital effect on the work of two other departments—the transportation department, by reason of engine failures on the road, and the motive power department, because of the important bearing which the character of water has on the cost of maintaining boilers in conditions for effective service.

It has been said that every derailment offers an excellent opportunity for an argument between roadway and equipment officers as to whether it was the fault of the track or a pair of wheels, but this problem is simplicity itself as compared with those incident to the conditioning of water for boilers. The treatment of water and its evaporation in a locomotive boiler involve problems of chemistry and physics on which there is no general agreement, even after many years of practical application. True, the economy of properly conducted treatment is generally accepted, but the difficulties experienced in the use of a particular treated water may give rise to controversies that may defeat a well-laid program for water improvement. In fact, from about 1910 to 1917 water treatment made little progress in the United States because of such misunderstandings between the supplying and using depart-

ments, and the prejudice against water softening plants which this engendered.

The management of the Chicago & North Western, which was among the pioneers in the use of water softening plants, avoided these pitfalls by a consistent policy of co-operation between the supplying and using departments, both in the development of improved water supplies and in the administration of facilities for water treatment. The methods pursued, as described on page 158 of this issue, are worthy of study by those confronted with these problems on other roads.

The Economy of Drainage

DRAINAGE is so elemental a subject that it seems trite to stress its importance. Nature has provided it and man is the beneficiary. But structures demanding stable foundations involve various alterations in natural drainage and this problem pervades the science of engineering as bookkeeping pervades banking.

Every trackman recognizes drainage as of basic importance to the railroad roadbed. His daily duties have to do largely with keeping open or creating channels through which water flows away from the track foundations and into natural or artificial stream beds, while in winter snow and ice demand additional similar attention. Drainage imperfections are literally, figuratively, financially, at the bottom of most of our track troubles. Probably more money can be saved for the dollar expended to perfect roadbed drainage, than for any other railroad maintenance improvement. Yet nothing seems so universally wrong with track conditions as the drainage. While the benefits of adequate drainage are obvious, the penalties of imperfections are severe. Track out of surface, track out of line, heaving track, pumping joints, broken angle bars, excessive wear of frogs and crossings, foul ballast, decay of ties, washouts—all familiar subjects to the trackman, are troubles traceable primarily to water where there should be no water. Manufacturers assert that if frogs and crossings were installed on properly drained foundations their service life would be doubled.

Poor drainage is a condition we have partly inherited. The early American railroad was built apace to develop our country. The hills were leveled to fill the hollows, bridges and culverts built to span the streams and ditches to provide runoff channels. The earth roadbed was crowned with earth used as ballast between the crossties. Increasing loads soon demanded track lifting on better ballast—cinders, gravel, slag, crushed rock. As greater wheel loads were imposed, the track continued to sink and with it the ballast. Time and again it was lifted on similar and then on better ballast. The low shoulders of the embankment were correspondingly raised and of necessity widened with earth from adjoining or nearby cuts, until the track, even in deep cuttings, had the appearance of being in continuous embankment. This widened roadbed permits the extension of the ballast shoulder and makes for track stability. To one who has walked the dirt crowned tracks of past years, a modern roadway with its wide roadbed, neatly trimmed rock ballast, heavy rails in perfect alinement, is an evidence of beauty and of strength.

Yet closer observation forces the question, why doesn't it stay so? With all these improvements, why has not maintenance work decreased? Is the answer increased costs of labor, of steel, of ties or increase of axle load, increase of speed, intensity of traffic? It is feasible by reviewing the ballast cross-sections obtained for valuation purposes to get, as it were, an x-ray of the real condition that causes most of our maintenance costs. Since the inception of railroad construction we have built dykes to hold water under the track, much as our great rivers have lifted their channels above the adjacent terrain by deposits of silt.

With ballast continually sinking under wheel loads, we have as continually lifted the shoulder with earth and the track with ballast until the only way water can recede is to seep out the slopes or down into the earth under the roadbed. Every ballast cross-section has a concave base. Every embankment, every cut, hides a ballast-filled trench beneath the track. Knowledge of this condition is widespread. The whole purpose of calling attention to it, is to emphasize the value to the railroads of scientific treatment of all phases of drainage.

Attention is drawn to this condition as fairly representative of the many drainage problems of American railroads, with the object of emphasizing the suggestion that railway managements be awakened to the profit they may derive from expenditures for drainage.

Safety a Factor in Track Awards

SHOULD a man's accident record be considered when rating track foremen? In other words, should foremen be rated ace high and awarded prizes for general excellence in their work, regardless of their safety records? This question was raised recently among a group of track supervisors, who agreed, incidentally, that the same question was applicable to themselves.

The method of rating foremen varies on different roads, but it usually consists of the grading of different classes of work for which the men are responsible. In other words, prize awards are made, in reality, upon the evidence of the ability of a foreman or supervisor to discharge all of the responsibilities which are assigned to him. In this broadened aspect which annual track inspections have gradually assumed, it is surprising that no road has included the foreman's or supervisor's responsibility for the safety of his men.

It is safe to say that most of the men who have the qualities necessary to win prize awards under the exacting requirements that prevail on most roads, are likewise the men who are the most efficient in promoting safety among their forces, but unfortunately, the records show that this is not true in all cases. Several roads award specific demerits for each low joint found on a foreman's section, and one road goes so far as to disqualify a foreman from consideration for prizes if the number of low joints found on his main line track equals or exceeds one per mile, or if the number of such joints found on his branch line tracks equals or exceeds two per mile. The result is a natural consequence—a determined effort on the part of these men to eliminate low joints in their tracks.

With safety in all of its phases assuming greater importance in the maintenance of way department, should not some such consideration be given to the prevention of personal injuries, with the hope of stimulating greater interest in improved safety records among track forces? This suggestion assumes that a system can be worked out in which due consideration will be given to the varying degrees of

hazard presented on different territories, and a distinction made between all reportable injuries and that smaller number for which a foreman or supervisor can justly be held partly responsible. The suggestion will bear careful thought by maintenance of way officers, and especially by those who have witnessed carelessness among their own men or who have noticed good records being made in track maintenance with apparent sacrifice of attention to safety.

Programming Will Aid Production

NOT A FEW baseball pennants have been lost by reason of games carelessly played at the beginning of the season. In like manner, many a track gang's work has been needlessly hurried in the fall because of unnecessary delay and loss of time in the spring. At this season, when maintenance forces on many roads are entering their period of greatest activity, it is well to bear in mind the importance of handling work with the same efficiency in April as when struggling to complete a job ahead of winter. This involves the preparation of a working program on which all essential tasks are scheduled, with sufficient leeway to permit a normal amount of special work to be done without serious disturbance to the program.

On construction projects where one task follows another in a more or less definite order, the necessity for planning is self-evident, but in routine maintenance work, and particularly that of section gangs, this is no less important, even though less evident. The work of section forces, of necessity, comprises a wide variety of tasks, some of which, such as tie renewals and ditching, require considerable time and can be planned in advance, while others are smaller and arise without notice. This wide diversity of tasks makes efficient production difficult at best; yet the very multiplicity of these tasks makes thorough planning all the more important, particularly since the number of men engaged in section work far exceeds that of any other group of maintenance employees.

It is contended by some that section work does not lend itself to scheduling because of the diversity of the tasks. In part this is true, but those roads which have studied the subject most closely have found that a surprising amount of the work can be scheduled. They have found further that schedules aid greatly in getting the essential work done, for they keep it before the foremen and their men at times when they might be inclined to "putter." No single measure will do more to raise the efficiency and increase the output of section forces than the careful scheduling of their work. At this season, when such schedules should be put into effect, the article by A. A. Miller, which appears on page 169, warrants special attention.

Heavier Rail in Secondary Tracks

IN THE construction of its new freight classification yard at Proviso, Ill., the Chicago & North Western has laid all tracks with 100-lb. rail. While this is not unique in railway practice, the use of rail of this weight throughout a large yard is sufficiently unusual to warrant comment. It reflects the growing appreciation of railway managements that money so spent will be reflected in reduced costs of maintenance.

Yard tracks are difficult to maintain at best. From the very nature of their service, derailments and other delays due to track defects disrupt operations so seriously that they are to be avoided. Further, allowances for the maintenance of such tracks are reduced far below those of corresponding mileages of main tracks, while the constant use of such tracks as ladder tracks makes it difficult for track men to work on them with any degree of efficiency. Even more important, however, is the fact that once a yard is placed in service, it is commonly difficult to secure authority to rebuild any of its tracks. The solution, therefore, is to build yard tracks properly at first.

The advantages of this construction are not confined, however, to large terminals; they apply equally well to smaller yards and to passing tracks. The same considerations of economy that have led to the strengthening of main tracks apply also to secondary tracks, for while these secondary tracks are not called upon to handle traffic at as high speeds as main tracks, the wheel loads are the same. It is an encouraging indication of current trends in practice that when strengthening main tracks, railway officers are not losing sight of their secondary tracks.

New Books

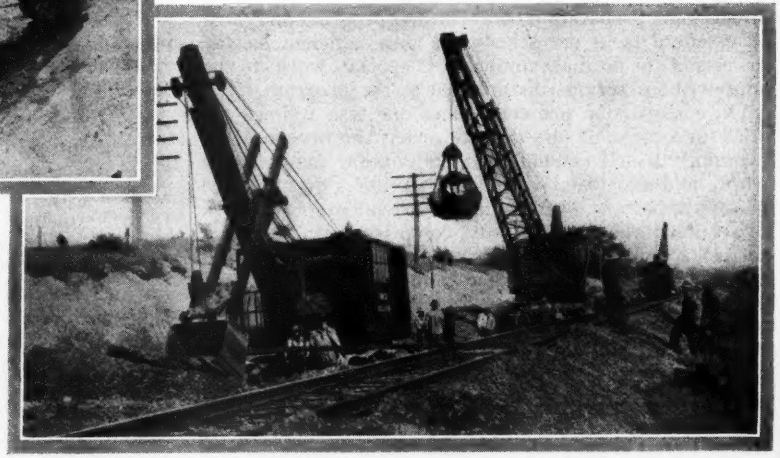
Proceedings of the Forty-Sixth Annual Convention of the Roadmasters and Maintenance of Way Association of America. 198 pages, illustrated. 6½ in. by 10 in. Bound in cloth. Published by the Association, T. F. Donahoe, secretary, 428 Mansion St., Pittsburgh, Pa.

As in previous years, this issue of the Proceedings comprises a complete report of the association's convention which was held in Detroit, Mich. on September 18 to 20, inclusive. It includes reports from committees on the Care of Winter Laid Rail, the Programming of Section Work, Conservation in the Use of Revenue Earning Equipment, Methods to Prevent and Overcome Damage to Rail Ends and the Organization of Track Forces. In addition, there are individual papers by Paul Chipman, valuation engineer of the Pere Marquette, on Permanent Concrete Track Construction; J. F. Deimling, chief engineer of the Michigan Central, on the Maintenance of a High-speed Railway, and C. B. Bronson, assistant inspection engineer, New York Central Lines, on the Relation Between the Manufacture and Service of Rail, as well as addresses by C. G. Bowker, general manager, Grand Trunk Western; C. E. Hill, general safety agent, New York Central, and Samuel O. Dunn, editor, Railway Age. An interesting feature of this volume is the report of the discussion of the various reports and papers presented.

Driving Piles for a Concrete Trestle on the Illinois Central

Machines Save Men in Grade Revision Work

Ditchers, modern dump and ballast cars, caterpillar shovels, spreaders and a track raiser were used to advantage on Rock Island



The first step in lowering tracks, shown above, was to employ ditchers widening the cut and excavating the ditch to conform to the new grade.

The second step, shown at the right, was to take up the track and dig out the roadbed to the new grade

THAT SOME railroads are fully as progressive as contractors in the use of modern grading equipment is demonstrated by the manner in which the Chicago, Rock Island & Pacific handled a grade-revision project, extending over about fifteen miles of double-track main line on the Illinois division during the last summer. The work was done entirely by railway forces with company-owned equipment that included a Bucyrus 65-C railroad-type shovel with a 2½-yd. dipper; two American "Gopher" caterpillar-tread, gasoline-operated shovels of one-yard capacity; two American ditchers; two Jordan spreaders; a Nordberg track shifter and raiser; 30-yd. Western air-dump cars for handling dirt and Rodger ballast cars in ballast service. The force employed included three 60-man extra gangs, from 50 to 75 section men in small gangs, 50 bridge men and from 20 to 25 signal men. Four or five work trains were also employed daily in material service and grading.

The work involved in this project cannot be classed as heavy, as the total grading involved the placing of only 122,000 cu. yd. of material in embankments and the excavation of 86,000 cu. yd. in cuts, all of which was earth. With one minor exception, no line change was involved. What merits particular attention is the manner in which the work was handled to avoid interference with revenue train movements and to clean up each unit or section of the work in the shortest possible time. Of special interest is the way in which the grading machines and cranes were employed in the conduct of the work in places where the grade of the tracks was lowered only four to five feet, a form of grade revision without change of line that has always been found particularly troublesome and expensive, considering the amount of grading involved.

Why the Work Was Done

The Chicago, Rock Island & Pacific line from Chicago across Illinois to the Mississippi river has a ruling grade of 0.6 per cent against traffic in each direction. Across the Illinois prairies in the western part of the state and between Morris and Bureau, where the line follows the north bank of the Illinois river, the grades are much flatter than 0.6 per cent. The heaviest grades are limited to the rolling country between Blue Island and Morris, and there was also a 0.5 per cent grade on the ascent from the valley of the Illinois river at Bureau to the general level of the prairie country to the west.

It is this westbound ascent from Bureau that is concerned in the project here described. The total climb from Elevation 465.62 in the bottom lands, a mile or two west of Bureau, to Elevation 673 at Sheffield, a total distance of 15 miles, is made in easy stages by following the general direction of Bureau creek.

It was therefore readily possible to construct the original line with a maximum grade westbound of 0.5 per cent, with a rather undulating grade line that em-

braced considerable stretches of grades flatter than 0.5 per cent and some short stretches of grade descending westbound. The location was, therefore, one especially adapted to grade revision. Furthermore, it was possible to derive definite economies from the improvement in grades in this territory in spite of the fact that it would result in a change in the ruling grade against westbound traffic over only a portion of the division, namely between Bureau and Rock Island. This is owing to the fact that a considerable volume of coal from Illinis mines moves northward from Peoria over the water-grade line along the Illinois river to Bureau and thence westward over the main line. Consequently, with the completion of the improvement, this coal can move in through trains from Peoria to Rock Island or it can be used to fill out tonnage in main-line trains moving west from Chicago.

Character of the Improvement

Actual changes of track grades covered 9½ miles of the line in five different places in a total distance of 15 miles. The longest unit was 28,500 ft. in length and the shortest, 1,500 ft. The work was about equally divided between track raising and track lowering, the maximum raise being about 7 ft. and the maximum cut about 12 ft.

As the general ascent of the line is to the west, there was no object in altering the grade of the eastbound track except to the extent that this was necessary to avoid excessive differences between the grades of the two tracks. Such differences were limited to 8 in. at highway grade crossings and to 2½ ft. elsewhere.

The methods followed in the conduct of the work were varied to suit conditions, and may be divided roughly into three classifications: Track depressions, not exceeding five feet and of such length that the entire work could be completed in about ten days' time; track raising that could be carried out under traffic; and changes of grade that were more pronounced and entailed greater complications and a longer construction period.

Raising Tracks Under Traffic

An illustration of the procedure followed in the case of moderate raises in grades is afforded by the most easterly section of the work, where the westbound track was raised over a distance of 8,000 ft. to a maximum height of 6 ft. and the eastbound track was raised for a length of 6,000 ft. to a maximum height of 4 ft. All of the filling material, 20,000 cu. yd., was obtained from borrow in a cut about midway of the length of the section. The material, alternate strata of sand and joint clay, was excavated by the steam shovel with a 2½-yd. bucket and loaded into 20-cu. yd. air-dump cars, handled in one train of 14 cars.

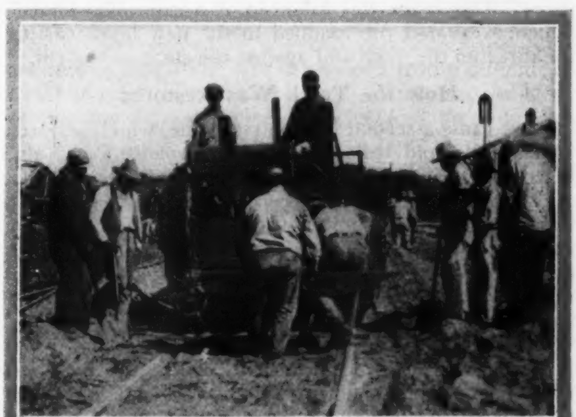
The tracks were raised in place under traffic, a portable telephone and an operator being maintained on the work to insure that the track was in condition to pass a train whenever necessary. The track was raised with the aid of the Nordberg track shifter in 12 to 18-in. lifts after the filling material had been unloaded and distributed by the spreader, ready to be worked under the ties. As the sand could be handled most readily for this purpose, an effort was made to provide it for surfacing, and use the clay to widen the shoulders.

As side-dump cars were used in handling the filling material, the material trains were dumped from the track opposite the one which was being raised. When raising the westbound track, the material was therefore dumped from the eastbound track which, in some places, was 2½ ft. lower than the track on which the dirt was being dumped, but this entailed no difficulty and did not result in appreciable fouling of the ballast in the track from which the dumping was done.

In addition to its service in raising track, the track raiser was employed to advantage in raising a 17½-ft. deck girder span a vertical distance of 3 ft. To do this, the machine was employed in exactly the same way as it was operated when raising track, the girders being lifted with the track when the track lifter was set adjacent to one of the abutments, blocking being placed under the girders on the bridge seats at the same time that the approaches to the bridge were being raised. By making alternate lifts at one abutment and

The third step in lowering tracks, shown at the left, was to replace the ballast and relay the track

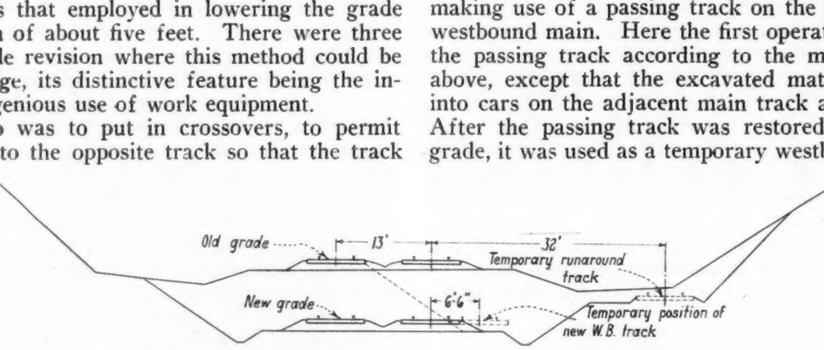
The track lifter, shown below, was used in raising track with a marked saving in labor



then the other, the full raise of three feet was made without any difficulty.

By far the most unique method developed in the entire project was that employed in lowering the grade line a maximum of about five feet. There were three sections of grade revision where this method could be used to advantage, its distinctive feature being the intensified and ingenious use of work equipment.

The first step was to put in crossovers, to permit trains to move to the opposite track so that the track being lowered could be taken out of service. The first actual operation was to empioy a ditcher train with two American ditchers and four air-dump cars to widen the cut and excavate the ditch to the required cut cross-section for the lower readbed level. This work completed, a locomotive crane equipped with a clamshell bucket was used to take up the track. The rails, ties and part of the ballast were deposited on the shoulder of the opposite track, while several men threw spikes, bolts, tie plates and rail anchors between the rails of the other track. This crane was followed by a caterpillar shovel, which excavated the roadbed to the new level, casting the dirt into the ditch and against the slope of the cut.



Typical Cross Section of the Cut East of Wyanet

Three views of the work near Wyanet. Above—one track lowered to new grade, ballast of old grade is seen at the right

Center—looking east into the cut during construction, showing temporary location of tracks. Above—crane taking up track

How the Track Was Restored

Next came a second locomotive crane, which restored some of the old ballast to the new roadbed and also lifted back the ties and rails for rebuilding the track. As soon as the track had been relaid, it was placed in condition for the resumption of regular train operation, and as opportunity afforded, a ditcher train was again employed to clean up the material excavated and thrown into the ditch or against the cut slope by the caterpillar shovel.

This program worked very successfully and rapid progress was made. As much as 300 ft. of track was removed, excavated and replaced in a day's time. Work on some of the smaller sections was completed for one track to a point where traffic could be restored in about ten days.

At Sheffield, a variation of this plan was employed by making use of a passing track on the north side of the westbound main. Here the first operation was to lower the passing track according to the methods described above, except that the excavated material was loaded into cars on the adjacent main track and hauled away. After the passing track was restored on the lowered grade, it was used as a temporary westbound main track while the westbound track was being lowered, and when the work was completed on this track, it was used in turn as a temporary eastbound main track, while the eastbound track was being lowered to the new grade. Work on the two main tracks was carried out in the same way as on the passing track, except that the excavation was made by ditchers from the track previously lowered, rather than by the caterpillar shovel.

Heavier Work Near Wyanet

The heaviest section of the work embraced the 15,000 ft. east of Wyanet, involving a raise of grade on a fill for 8,000 ft. and the lowering of the grade in a cut for 7,000 ft. The maximum lift on the fill was about 7 ft., while the maximum depression of the track in the cut was about 10 ft., resulting in a maximum depth of cut of 40 ft. and a maximum height of embankment of 20 ft. Here the methods described above were not applicable and an entirely different plan was adopted, which was particularly suited to the location, because, as seen in the typical cross section, the cut was an unusually wide one, having served as a borrow pit for the making of long fills on each side during the original construction.

The first step in this work was to employ a caterpillar shovel to prepare a roadbed for a temporary detour track with its center line 32 ft. north of the center line of the westbound main track. This temporary roadbed,

which was about 1¼ miles long, was formed by having the shovel cut a shoulder in the side of the cut, increasing the side slope to 1 to 1 and casting the material thus excavated on the side toward the main tracks. After this track had been built and placed in service, work was started on the lowering of the westbound track, using both the 2½-yd. steam shovel and one of the caterpillar shovels by having them begin at the middle and east end of the cut, respectively, and work westward. During this operation the temporary track was used during working hours as a loading track while revenue traffic in both directions was handled on the eastbound track, but at night double-track operation was maintained by using the temporary track for westbound trains.

This operation was continued until the cut had been taken out as wide as was permissible without endangering the safety of the old eastbound track, at which time it was possible to establish the new westbound track in the cut in a temporary location, 6 ft. 5 in. north of its final position. This done, revenue traffic, during working hours, was handled in both directions over the temporary detour track on the north slope of the cut, while the track in the cut was used for loading, but both this track and the detour track were used in double-track service at night. This arrangement permitted work to proceed in the excavation of the remainder of the cut, the two shovels starting work in the same locations as before.

Relaid Track Close Behind the Shovel

To advance the completion of the work and the restoration of traffic, the work of relaying the eastbound track in its permanent location in the cut, was carried on as close behind the shovels as possible so that this track was ready for service shortly after excavation was completed. In this work, also, locomotive cranes were used in removing and relaying tracks as a means of saving labor. In the rearrangement of tracks, described above, provision was made to have signal men install bonds on all tracks used to handle revenue service so that the continuous signal protection was afforded at all times, regardless of the temporary nature of the track.

The excavation work on the entire project was not seriously affected by wet conditions due to rainfall, but at one point where the railroad is located close to and at a lower elevation than the Hennepin canal (an artificial waterway extending from the Illinois river at Bureau to the Mississippi river south of Rock Island), seepage from the canal softened the bottom of the cut to such an extent that it was necessary to cover it with refuse from a zinc smelter before tracks could be laid.

Ballasting Operations

The tracks were ballasted with a sub-ballast of from six to eight inches of pea gravel from a pit in the Illinois river bottoms at Chillicothe, Ill., on the Peoria line. This was later covered with a top ballast of four inches to six inches of crushed and washed gravel from the ballast plant of the Chicago Gravel Company at Rockdale, Ill. The Rockdale ballast was handled in Hart selective-type ballast cars and the Chillicothe ballast in the older type of Rodger ballast cars.

The grade revision project was planned under the direction of C. A. Morse, chief engineer of the Rock Island. The method of handling the project was developed by W. H. Petersen, engineer maintenance of way of the First district, in co-operation with the division officers who directed the work. These included C. L. Ruppert, division superintendent; A. C. Bradley, division engineer; J. L. Jensen, roadmaster; G. E. Brooks, master carpenter, and R. A. Brown, resident engineer. Mr. Petersen has since succeeded Mr. Morse as chief engineer and Mr. Bradley in turn has been promoted to succeed Mr. Petersen.

Built-Up Wooden Beams Have Many Advantages

BUILT-UP or laminated wooden beams, made by fastening together two or more planks of like width with nails, bolts, or similar devices, have unquestionable advantages compared to solid beams. They may be constructed of smaller lumber which is readily available and easily and quickly seasoned, and they contain fewer shakes, checks, and other defects. This is the conclusion reached as a result of general observations of built-up members, and of tests of built-up beams composed of planks free from defects, made at the Forest Products Laboratory, U. S. Forest Service.

The opinion has often been expressed that where two or more boards or planks are used together and loaded so as to deflect or bend equally, the stiffer pieces will take the greater share of the load, and will therefore fail before the less stiff pieces. It is true that the stiffer pieces will take the greater load. Tests show, however, that a plank of high stiffness will normally bend slightly farther before it fails and will withstand a larger maximum load than a plank of low stiffness. In other words, beams built up of planks without defects, such as knots, will tend to fail in the less stiff rather than in the stronger planks.

Another opinion sometimes advanced in favor of the built-up beam is that staggering the defects in the planks of a built-up beam will increase its strength. Tests show that the popular thought is in error and that staggering the defects does not add materially to the strength of the beam. It is apparent that there is no marked difference in strength between built-up and solid beams, but because of other advantages they offer, built-up beams may well be used as girders in residence buildings, small stations and other frame structures.

One of the principal advantages attaching to their use in that the material may be readily obtained in a dry or comparatively dry condition. This is in contrast to the condition of solid beams, which in the larger sizes may have a relatively high moisture content even after two years of drying.

Planks of the size ordinarily used in built-up beams are much more readily available than solid beams and, if necessary, can be obtained from almost any yard. Solid beams, when ordered from the mill, are frequently received in a green condition, and their use in this condition lays them open to the difficulties incident to shrinkage and decay. Moreover, built-up beams can be assembled in place and do not have to be lifted by special means. They can be constructed in any size and installed just as they are needed.

Material for built-up beams can be obtained from smaller trees, which require shorter growing periods than do those from which solid beams are cut. Furthermore, it may frequently be obtained as a by-product in manufacture. Built-up stock does not develop shakes and checks in seasoning as readily as solid beams, and because it is, as a rule, better seasoned, it gives additional strength which is seldom taken advantage of in the design of large structural beams.

Water Softener of 200,000-gal. capacity at South Pekin, Ill., and three storage tanks of 70,000-gal. capacity each

Co-operation Produces

in Water Treatment

By R. E. COUGHLAN

**Supervisor of Water Supply,
Chicago & North Western, Chicago**

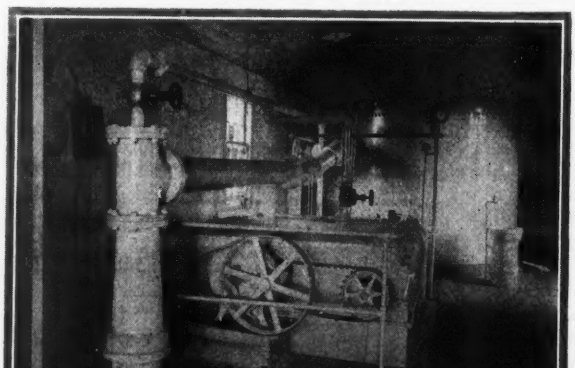
THE Chicago & North Western system embraces 10,215 miles of lines, traversing nine states, in which the quality and quantity of water available for locomotive boiler operation are subject to wide variations. For this reason, the problem of providing adequate and suitable water supplies has had the attention of the management for many years with the result that the North Western was among the pioneers in the roadside treatment of water containing encrusting solids. It has also been responsible for the development of an organization for the improvement of the water supply.

As early as 1886 a card system of records was established to show the chemical analysis, source of supply and amount of water used daily, as well as the troubles encountered in the use of all of the water supplied at the individual water stations on the entire system. To this record has also been added similar information concerning farm and city wells, as well as other sources of supply in the territory through which the railroad operates. This record of information has proved invaluable in the relocation and spacing of water stations, made necessary by reason of the increased amount of water used by the larger locomotives which are now operated in all classes of service. To supplement this information a complete geological record of the water supplies of the states through which the railroad operates is also kept on file. The varied quality of the water encountered on the railroad may be illustrated by the specimen analyses given in the table:

Location:	Little Lake, Mich.	Marshall, Minn.	Wendt, S. D.
	Analysis in Grains per Gallon		
Total Solids	3.00	63.23	209.74
Carbonate of lime	0.52	10.65	2.02
Carbonate of magnesia	0.05	0.00	1.16
Sulphate of lime	0.00	18.45	0.00
Sulphate of magnesia	0.07	19.54	0.00
Oxides of iron and alumina	0.02	0.09	0.41
Silica	0.09	0.54	1.29
Alkali chlorides	2.06	1.60	137.27
Alkali sulphates	0.19	12.36	0.13
Alkali carbonates	0.00	0.00	67.46
Incrusting solids per 1,000 gal.	0.11 lb	7.04 lb.	0.70 lb.

It is not only necessary to obtain water in sufficient quantity where it is required, but it is also necessary to give close consideration to the quality of the available water when locating water stations. Water from municipal supplies along the line is purchased where circumstances are favorable, but at many places an insufficient supply, an unsatisfactory quality of the water, and high rates prohibit the utilization of such sources. In such cases the railroad must provide its own supply with the necessary storage and pumping facilities to fulfill traffic requirements.

Prior to 1903, the importance of the quality of water supplied to locomotive boilers did not always get the close consideration which it receives at the present time. Unsuitable water was corrected in part by introducing chemicals into the water on the locomotive. The first



Interior of Softener Plant at New Butler, Wis.. Chemical Mixer in the Foreground

Both the mechanical and engineering forces on the Chicago & North Western keep a close check on both the methods followed and the economies obtained

Results

definite step in the improvement of the quality of water before delivering it to locomotives was made early in 1903 on that part of the main line between Chicago and Omaha, Neb., known as the Iowa division. This division extends from Council Bluffs, Iowa, to Clinton, a distance of 348 miles, and carries a heavy traffic including grain and live stock on the way to Chicago and the eastern markets. Traffic of this nature must be handled without delay, as a few hours delay in reaching the market may mean a direct financial loss to the carrier. Prior to 1903, it was the practice, when traffic was heavy, to station reserve locomotives at various points along this division in readiness to relieve locomotives that failed because of leaking or other boiler troubles.

First Softening Plant Built in 1904

The initial step in the improvement of the water supply consisted of the construction of 17 lime and soda-ash water-softening plants at water stations in this district. When this installation was completed in 1904, it was by far the most complete that had been carried out on any road up to that time.

With these softening plants in operation, the resulting increase in the life of the boilers, the saving of fuel, the lower maintenance costs, etc., soon totalled an amount equal to the initial cost of the plants. The improvement in boiler operation was almost unbelievable. The reserve locomotives became a thing of the past and today engines operating over this district are being held at terminals only long enough for the necessary running repairs. A boiler failure because of leaking is unknown.

These original plants were of the intermittent type and, with the exception of the first one, were constructed by company forces. The program of improvement was extended until there were 30 water softening plants in operation at various stations in Iowa, Minnesota, Dakota, and Illinois.

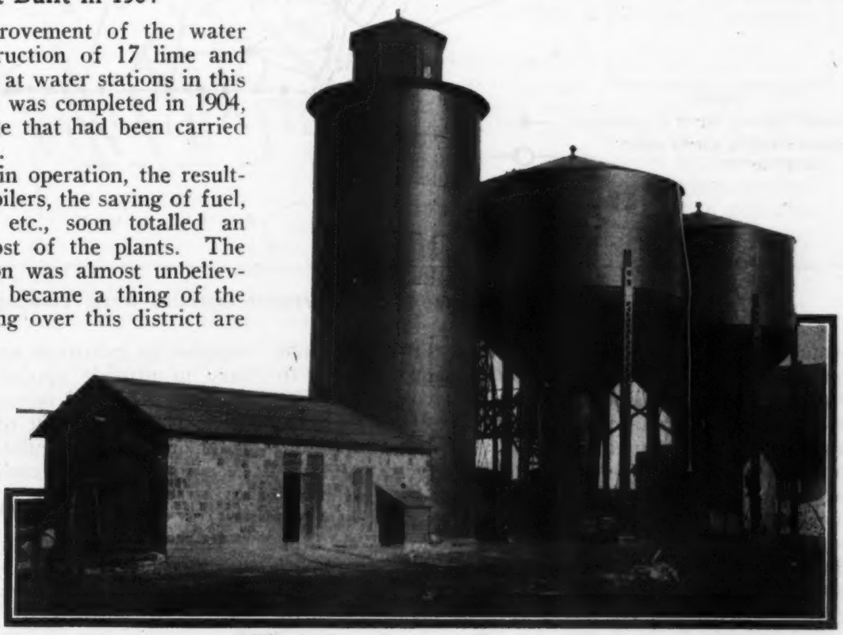
In 1922, after the World war, the program was again taken up by the construction of two of the modern continuous type plants. Following this, 5 plants were installed in 1923-24, 6 in 1925 and 13 in 1926-27, so that at present, there are in service 53 plants that supply each day approximately eight million gallons of water that is softened by the removal of about eleven tons of scale-forming matter.

Some idea of the financial advantage of removing this amount of scale-forming matter from the water supplied to locomotive boilers may be obtained by referring to the report of the American Railway Engineering Association, Volume 25, page 167, in which the statement is made that one pound of scale in the water supplied to locomotive boilers results in a loss of 13 cents to the railroad.

This saving is further reflected in the operating reports issued at regular intervals by the motive power department. With no softening facilities and with only partial facilities these reports showed as high as 391 locomotive boiler failures per month that can be charged to water condition. At the present time these reports seldom show one failure per month, as a failure from this cause results in a thorough investigation to the end that the proper steps may be taken to prevent a recurrence.

Reduce Hardness to a Minimum

In the operation of the water-softening plants every effort is made to reduce the hardness remaining in the soft water to a minimum and at some of the plants this runs as low as one grain per gallon. Of course, due consideration is always given to the fact that "light water" or foaming trouble cannot be tolerated in train operation. So, in order to supply water of the desired low hardness without using an excess of chemicals, it



The water treating plant at Boone, Iowa, has a capacity of 23,000 gal. per hour and provides storage for 250,000 gal.

has been found advisable at some stations to add sodium aluminate after the lime and soda ash have had time to become thoroughly mixed with the water.

The operation and maintenance of the water softening plants is directly under the jurisdiction of the division engineering forces, but responsibility for the quality of the water rests on the supervisor of water supply with headquarters at Chicago, who directs the necessary laboratory control and field inspection. Samples of the softened water from each plant on the system are sent to the laboratory at Chicago each week for analysis. These analyses are supplemented by frequent inspections and field tests, as it has been found that rigid technical supervision is absolutely essential to the proper treatment of water. The supervisor of water supply furnishes the necessary formula data for the proportioning of chemicals at each plant, adjusting these formulas as often as necessary in order to meet changing conditions or seasonal variations.

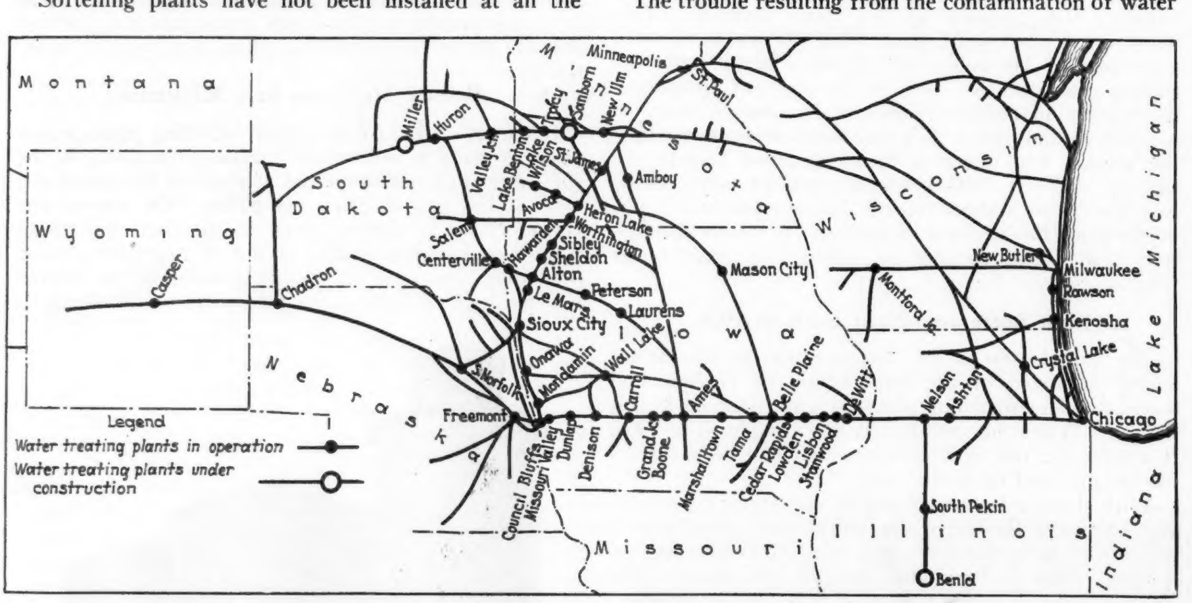
Water Treater Applied to Locomotives

Softening plants have not been installed at all the water stations where the character of the water could be improved by treatment, but water not subjected to roadside treatment is treated on the locomotives with reagents formulated and manufactured under chemical supervision by company forces. A simple automatic proportioning device is attached directly to the feedwater line of the locomotives where this form of treatment is used. The necessary amount of the treatment is placed in these regulators at the terminal and the device functions in conjunction with the operation of the injector with no further attention by the engine crews. Such treatment is also directly under the jurisdiction of the supervisor of water supply. Small testing outfits are supplied to the motive power department at all terminals where this form of treatment is used. The men in charge of the maintenance of boilers obtain samples of water directly from the boilers of the locomotives and test them to determine the proper amount of treatment to be used to eliminate boiler scale. The results of these tests are reported at regular intervals and are supplemented by actual joint inspection of the boilers so that the men of the motive power department can actually see the results of their own technical supervision.

Careful Attention to Blowing Off

Careful attention is given also to those phases of locomotive operation which play an important part in the success of any form of water treatment. The locomotive crews are carefully instructed in the proper use of the blow-off cocks as a means of reducing the concentration of dissolved solids in the boiler. This plays an important part in avoiding trouble from foaming and is given particular attention in all engine districts at all times. To facilitate blowing off boilers on the road, the locomotives are equipped with levers for the operation of the cocks from the cab.

The excellent co-operation of the motive power department with the supervisory forces of the water supply organization has resulted in a very gratifying improvement in the condition of the locomotive boilers, which is reflected directly in lower maintenance costs, better train operation, fuel saving, etc.



Where the Chicago & North Western Operates Water Treating Plants

The trouble resulting from the contamination of water supplies by industrial wastes sometimes makes it necessary to provide special equipment. At one point a specially designed storage tank is being constructed to settle wood pulp out of water which is otherwise of good quality. Coagulation alone will be the means of accomplishing this result.

Corrosion Now Being Investigated

With the program for the elimination of boiler scale progressing favorably, more attention is now given to the problem of the corrosion of boilers, with which nearly all railroads are now confronted. Three meth-

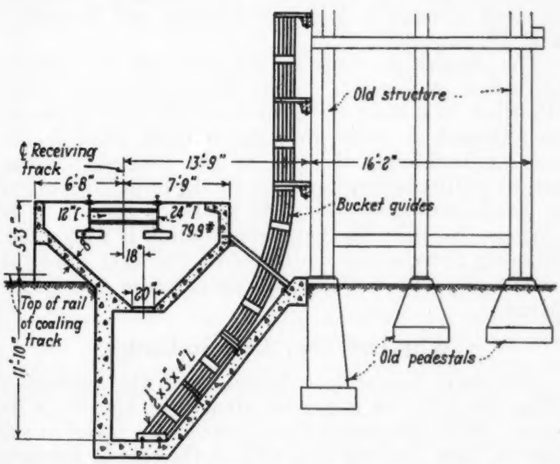
ods of meeting this problem have demonstrated their effectiveness and all three are being applied on the Chicago & North Western. These are the excess alkaline treatment, the installation of feed-water heaters, and the use of counter-electrical potential devices.

The excess treatment has proved successful in locomotive districts where it is possible to supply water of uniform alkaline content, low in oxygen. Fourteen of the open type feed water heaters are in service on locomotives in districts where corrosion and pitting have occurred and the results obtained by their use are being carefully observed. Six of a well-known counter-electrical potential device are being installed on locomotives which will operate in districts where this trouble is present. The results obtained with the use of these devices will be apparent within the next two years.

The results obtained in the operation of the water softening plants, together with the use of internal treatment properly supervised, have been made possible only by the excellent co-operation of all departments directly interested in train operation and maintenance. The management is keenly interested in all projects which will result in economy and safety, and proper attention to the water supply aids in securing these results.

How an Old Coaling Station Was Modernized

THE modernizing of locomotive coaling facilities is commonly understood to mean the replacement of an old coal trestle, or a bin served by a locomotive crane, with an up-to-date plant having a track hopper, automatic coal hoist and a storage bin provided with efficient gates and aprons for the delivery of coal to

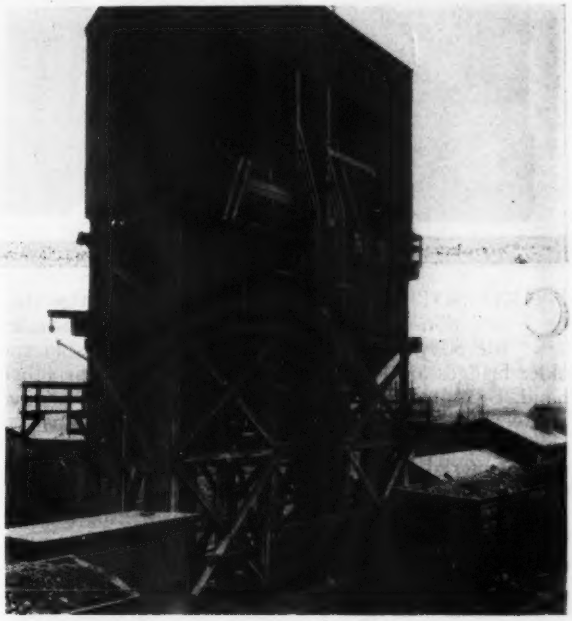


How a Track Hopper Was Provided Adjacent to the Old Structure

locomotives. That such an elaborate improvement is not necessary in all cases for the modernization of coaling stations, is illustrated by what the Boston & Maine was able to accomplish with an old coaling plant at Troy, N. Y.

This was an elevated wooden bin of 230 tons capacity, having the top of the bin 43½ ft. above top of rail of the coaling track. This bin was supplied with coal with the aid of a locomotive crane provided with a clam shell bucket, and, as the bucket had to be hoisted to an opening in the side of the house over the top of the bin for discharge, it was necessary to use a crane with an exceptionally long boom. The use of a locomotive crane, of course, required the employment of a competent hoisting engineer to operate. Furthermore, as some of the coal was delivered in hopper-bottom cars, it was difficult to clean the cars thoroughly with the clam shell bucket.

The excessive cost of handling coal by reason of the conditions outlined above led to studies for the replacement of the station, but this was deemed undesirable because the old structure was in good condition and was clearly capable of useful service for a number of years to come. After investigation disclosed the possibilities of providing it with modern coal han-



The Remodeled Coaling Station in Service

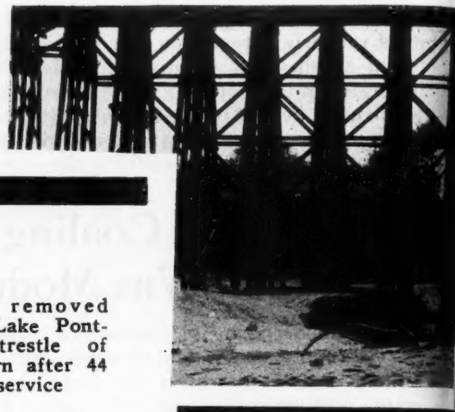
dling facilities, authority was granted for the complete modernization of the old station with equipment to be furnished by the Roberts & Schaefer Company, Chicago.

The first step was to provide a concrete track hopper 20 ft. long and a bucket pit. To reduce excavation to a minimum, the coal-receiving track was raised 5 ft. 3 in. above the level of the coaling track, the bottom of the bucket pit being 11 ft. below ground level. From the bottom of the bucket pit, angle-iron guides were extended up the side of the old structure and into the opening in the house on top of the bin for the operation of a self-feeding skip bucket. This, and all other equipment for the operation of the coal hoist, including an automatic loader for feeding the coal from the track hopper into the hoist bucket, the dumping mechanism at the top of the hoist and the hoist itself, conform in all details with equipment installed by the Roberts & Schaefer Company in new coaling stations. The automatic electric hoist, with direct-connection drums and a Cutler-Hammer automatic controller, were installed in a small house erected for the purpose adjacent to the track hopper. The coaling station, as remodeled, is operated in every way like a complete new structure, but to carry the improvement still further, the three old wooden chutes for the delivery of coal to locomotives were removed and replaced by new side-cut, non-skim coaling gates and steel aprons manufactured by the same firm.

Making G

By DR. HERMANN VON SCHRENK

Consulting Timber Engineer,
New York Central Lines, St. Louis, Mo.



Stringers removed from the Lake Pontchartrain trestle of the Southern after 44 years' service

CREOSOTED timber has been in use in bridge construction on various railways of the United States for 50 years, and many original timbers in the older bridges are still in good condition. On the other hand, creosoted timbers placed in bridges of more recent construction have occasionally failed for one reason or another.

It occurred to me some time ago to make a more-or-less critical study of the service of creosoted timber in wooden bridges with the idea of ascertaining what factors were principally involved in determining the longest possible life. A study of this kind seemed particularly significant at this time when many creosoted wooden bridges are being constructed and because of the fact that there is a great deal of discussion as to the comparative investment value of creosoted wooden bridges, particularly ballast-deck bridges, as compared with concrete bridges.

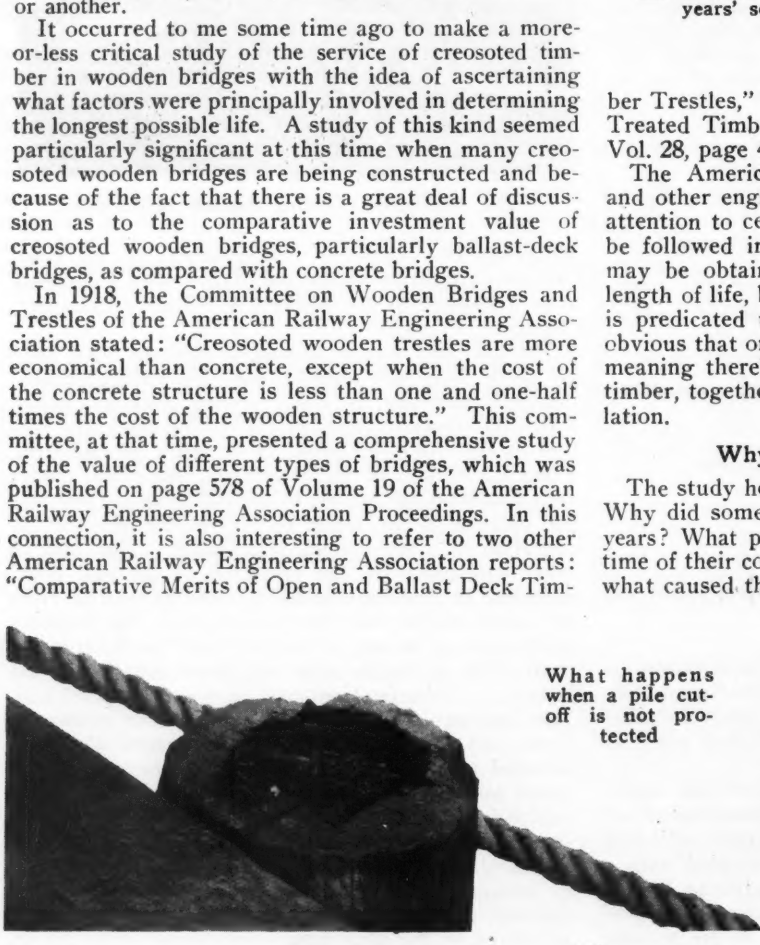
In 1918, the Committee on Wooden Bridges and Trestles of the American Railway Engineering Association stated: "Creosoted wooden trestles are more economical than concrete, except when the cost of the concrete structure is less than one and one-half times the cost of the wooden structure." This committee, at that time, presented a comprehensive study of the value of different types of bridges, which was published on page 578 of Volume 19 of the American Railway Engineering Association Proceedings. In this connection, it is also interesting to refer to two other American Railway Engineering Association reports: "Comparative Merits of Open and Ballast Deck Timber Trestles," Vol. 26, page 546, 1925, and "Value of Treated Timber in Wooden Bridges and Trestles," Vol. 28, page 404, 1927.

The American Railway Engineering Association and other engineering bodies have repeatedly called attention to certain fundamental rules which should be followed in order that the longest possible life may be obtained. I refer to the longest possible length of life, because, where a long-term investment is predicated upon 40 or 50 years of service, it is obvious that only the best construction is warranted, meaning thereby the purchase of the best grade of timber, together with careful preparation and installation.

Why Did They Last So Long?

The study herein deals largely with the questions: Why did some of the older structures last 40 or 50 years? What precautions were obviously taken at the time of their construction, and, in the case of failures, what caused those failures? It might be added that these reflections with reference to creosoted bridges apply with equal force to other forms of treated timber and while the present discussion deals entirely with bridges, the same type of study and the same type of reasoning might be employed with equal profit with respect to cross ties and other forms of treated lumber or timber.

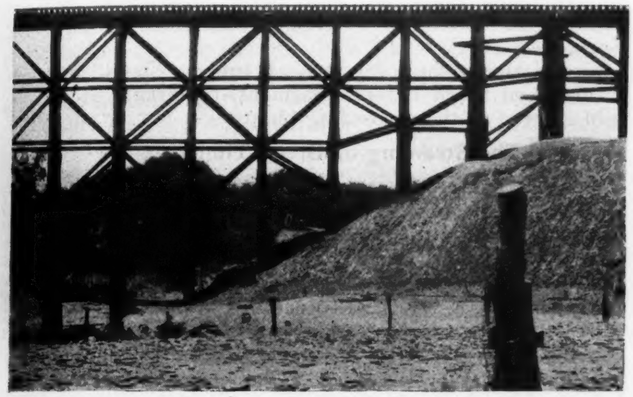
Experience has shown that those bridges which gave the longest service were constructed of the highest quality of wood obtainable,



What happens when a pile cut-off is not protected

Good Timber Last Longer *in Bridges*

A critical analysis of the factors which are involved in obtaining the longest possible life from treated wood used in construction



since creosote does not materially effect the strength of the wood. It is now recognized that the proper attention to density, together with the number of rings of growth and the proper distribution and size of knots, will usually provide timber which can be depended upon for strength.

The American Railway Engineering Association has recently adopted grading rules for structural timbers (Proceedings Vol. 28: 323-397; 1927). Timber to be treated should conform to Code 4 in the case of beams and stringers; to Code 24 for joists and planks, and to Code 44 for posts and timbers. It may sometimes be possible for a railroad to buy timbers more economically without the purchasing order specifying A. R. E. A. standards, particularly when sawmills are located on their own lines, but, even in such cases, the greatest care should be taken to see that the timbers furnished actually conform to the American Railway Engineering Association standards.

Framing Before Treatment

There has been a great deal of discussion as to the framing of timber before treatment. It is now generally recognized that if creosoted timber is to give the maximum life, it must not be wounded after treatment. Wherever creosoted pieces are cut, or where holes are bored, the untreated wood is generally exposed and it is at such points that decay will start.

There is probably no factor having a greater influence on the ultimate length of life of timbers in wooden bridge structures than the cutting or boring of holes subsequent to treatment. This is well known by all roads which have used creosoted ballast-deck structures. It will be noted from the attached summary representing the practice of 10 railroads that practically all of them preframe bridge timbers to a certain extent, this ranging from simply cutting to length to complete framing, including the boring of holes. Within recent years, several railroads have installed small sawmills at their creosoting plants in which the timbers are sawed to lengths, sized as to width and thickness and frequently bored for bolt holes. One of the most recent instances is shown in the accompanying illustration of a 27-panel, 3-ply chord open-deck structure, framed at the Denison (Tex.) plant of the Missouri-Kansas-Texas last year. This was put together before treatment exactly as it would be erected and the holes were bored after each member was framed and fitted. Each piece was then marked with a stencilled metal tag so that, after treatment, the bridge could be erected as originally put together. The M-K-T also makes it a practice to drive bents before the deck plans are made, which insures the correct application of properly fitted caps. Most bridge men object to the latter practice, but, with proper planning, it is believed to be entirely practicable.

Southern Pacific Practices

Particular attention is also called to the practice of the Southern Pacific, which has probably used this type of construction longer than any other road. Both the Texas and Louisiana Lines and the Pacific System frame and bore all stringers and, on the Texas and Louisiana Lines, all caps are also bored for drift bolts. The same method is employed by the Louisville & Nashville, which has been using this type of bridge for 50 years, framing and boring all members by blue print for each bridge.

A valuable report on the framing of bridge timbers before treatment was given in 1926 by Earl Stimson, chief engineer of the Baltimore & Ohio, before the annual convention of the American Railway Bridge and Building Association, (see Proceedings of the American Railway Bridge and Building Association 36:169; 1926), in which he discussed the installation of a framing plant, which cost $35,000 and which was erected at the B. & O. creosoting plant. Mr. Stim-

son made a particularly strong plea for such installations at creosoting plants, stating:

"The value of the increased life of treated timber that accrues from preframing can at best only be estimated, but the savings in comparison with hand methods in the field are subject to exact determination. So far this year, our costs show a considerable decrease."

Economies Effected by Preframing

Mr. Stimson gave the following figures for the operation and results of the plant in 1925:

"Amount framed: 41,551 pieces, or 2,953,264 ft. b.m. The cost of framing bridge ties and guard rails, including all charges, both operation and fixed, was $6.96 per M.b.m. as compared with $16 per M.b.m. if done by hand. The cost of sizing trestle ties, including cutting to length and planing to thickness, was $4.77 per M.b.m., as compared with $7 additional cost if bought sized to thickness. The sawmill was not installed until 1926 so that the plant involved in the 1925 operation cost $28,940. On the basis of these unit costs, the savings for the first year were $23,085 or 80 per cent of the cost of the plant."

He also called attention to the fact that dire results were prophesied when a central plant of this type was discussed, and stated that this did not prove to be the case. Using framing plans with definite identification marks, he said, "It is remarkable how few misfits are found and more often these are the results of mistakes in the framing plans rather than mistakes made in the mill."

A further development with reference to framing has come about within recent years looking towards the avoidance of cutting timber after creosoting. It was, and still is, the practice to dap guard rails. The Atchison, Topeka & Santa Fe has discontinued the practice of notching the creosoted guard rails, and Bulldog tie spacers are now used. The Santa Fe also takes pains to order stringers of definite lengths, even when special items are necessary. For instance, if some short stringers are required for the first panel in a bridge to avoid the old bents, these stringers are ordered in the exact lengths required.

The extent to which it is possible to avoid cutting timber after treatment is well illustrated by the experience of the Santa Fe last year when nearly a mile of creosoted timber bridges was built, concerning which it was said: "We have not cut a single stick of creosoted timber other than piling at the caps." It should be pointed out that even a very slight penetration of creosote obtained under pressure in the cylinder offers sufficient protection. Brush-coating cut surfaces after treatment is nearly always a makeshift and cannot, by any means, be relied upon to give the same service life as where the timber is treated under pressure. This subject will again be referred to under the heading "Protection of Cut Surfaces."

Summarizing the foregoing, all timbers should be framed and bored before treatment, preferably at a mill erected at the creosoting plant.

The Steaming of Green Timbers

With very few exceptions, the railroads in the United States today treat only air-seasoned timber. This has come about because of many investigations which have shown that steaming of green timber reduces its strength. In this connection, a report by Professor W. K. Hatt (Proceedings A. R. E. A. 28: 1164; 1927) is of interest. Professor Hatt, in his conclusion, says: "A loss of strength from the action of steam must be accepted. The amount of such loss depends upon the pressure and duration of the steam, increasing with pressure and with duration. By reference to the detailed accounts of investigations and the summary table, the loss of strength through steaming is shown to be from 15 to 50 per cent."

It is unquestionably true that there are many creo-

Summary of Practices of 10 Western Railways

	KANSAS CITY SOUTHERN	CHICAGO, ROCK ISLAND & PACIFIC	SOUTHERN PACIFIC Texas and Louisiana Lines	SOUTHERN PACIFIC Pacific Lines
1. How long have you used creosoted ballast deck bridges?	13 years	20 years	40 years	33 years
2. Do you frame timbers before treatment?	No - timbers purchased to size. Have framed some ties.	Outside stringers, decking and guard rails cut to length. All stringers and caps sized. Timbers on steel framed to exact lengths All bolt holes bored	Stringers framed and bored. Propose to dap, frame and bore guard rails- also to bore holes in caps and stringers for drift bolts	For framed bents, all framing and boring done before treatment. Pile trestle, stringers and guard rails are framed and bored; caps cut to length but not bored
3. Do you air season timber?	Yes	Yes	Yes	Yes - all
4. Do you steam timbers? If so, - how long?	Only in emergencies	No	Piling - 6 to 18 hours	No
5. Do you protect cut-off of piles? If so, - how?	Three coats of boiling creosote to pile surfaces - also holes and other cut surfaces	Hot creosote	Creosote and coal tar pitch In piles for bulkheads and fenders use sheet iron cover	Hot creosote, followed by hot asphalt. Believe felt protection would help
6. Do you permit chamfering?	No	No	No	Yes
7. Do you use drift bolts for anchoring stringers or angle irons?	Drift bolts	Drift bolts	Drift bolts	Drift bolts
8. Where have creosoted timbers failed? (a) Decay of framing after treatment (b) Around bolt holes (c) Internal decay (d) Crushing or shear (e) Other failures	None so far	None so far	Stringers around bolt holes Caps - crushing	(a) Very few failures due to framing after treatment. Some show decay. Fair percentage of piles decay from top down, evidently due to lack of protection at cut-off (b) Where new holes were bored after treatment and old holes not plugged, some decay at holes (c) Piles decay at ground line in interior (d) Crushing of caps due to weak timber under heavier loadings
9. How soon after installation have failures shown up?	None so far	None so far	Some caps and outside stringers in 12 to 16 years. Now replacing some 1890 to 1894 bridges account too weak for present loadings. Emphasizes bolt hole protection	No repairs before 20 years. Then change caps and splice piles
10. Where do you anticipate failures?	Probably pile heads	In stringers around bolt holes In caps around drift bolts		In caps

soted bridge timbers in service which were steamed, but in view of the definite determination just referred to, it looks like an unnecessary risk, and because of that fact, most of the railroads now practice air-seasoning entirely. It will be noted that of the 10 railroads referred to in the summary of practice, 8 use air-seasoned timber.

Protection of Cut Surfaces

In the case of creosoted piling, it is, of course, necessary to cut off the piles after driving. The proper protection of cut-off surfaces has for years been one of the most vexing problems in the construction of creosoted wooden bridges. It will be shown further on that most failures which have occurred are ascribed to injury which starts at points where the creosoted pieces are cut or wounded and that in the majority of such cases the wounds are caused by pile cut-offs. This has been found to be one of the weak points in this type of construction. Numerous experiments have been made to force creosote into the wood at freshly cut surfaces, but most of these have failed, because no efficient tool has yet been found which will fit the top of all piles. In some cases, where holes have been bored and filled with creosote, the penetration secured did not warrant the expenditure. Since early times, pile heads have been coated with hot creosote or, in some cases, with hot coal tar. When the work was well done, a certain amount of protection was obtained; frequently, however, this did not help. A striking case of failure to protect the freshly cut surfaces is shown in the accompanying illustration where the untreated part of the piles decayed from the cap down, in some cases 10 ft. or more, within a comparatively few years after installation.

The present practice on most of the railroads is to coat the exposed surface with at least two coats of hot creosote, while some roads apply coal-tar pitch or asphalt over the creosote. Others use some form of felt paper which is applied immediately after coating with creosote or pitch. The Louisville & Nashville and the Nashville, Chattanooga & St. Louis use metal coverings over cut pile heads. In the opinion of the writer, every expense to properly protect cut-off pile heads is warranted and it is suggested that pile heads be given two coats of hot creosote followed by a coat of pitch and metal caps of some sort or another.

Protection of the holes bored subsequent to treatment for bolts of various kinds is a very difficult matter. When holes are bored vertically, they should be filled with hot creosote; when they are bored horizontally, it is sometimes hard to get the creosote into the holes for a sufficient distance. The Texas and Louisiana Lines of the Southern Pacific have employed a device to inject creosote into the holes, by which, owing to the pressure developed, considerable penetration into the wood surrounding the hole is obtained.

There is a considerable difference of opinion as to whether piles should be chamfered. The A. R. E. A. has recommended against chamfering, and of the 10 railroads represented on the accompanying summary, 5 do not permit it. The writer is of the opinion that chamfering is a practice inherited from times when untreated piles were used and when the chamfered surface was regarded as essential to provide the proper run-off of water. Where creosoted piles are used, particularly if the cut-offs are protected with creosote and coal-tar pitch with subsequent felt or metal covering, it is obvious that chamfering will serve no good purpose and should be avoided.

Drift Bolts

Most railroads use drift bolts for anchoring stringers. The N. C. & St. L. uses no drift bolts, but instead uses line brace castings as shown on the accompanying drawing. Hunter McDonald, chief engineer of the N. C. & St. L., advises as follows with reference to these castings, which have been used on that road since 1908:

With Respect to Treated Timber in Bridges

NASHVILLE, CHATTANOOGA & ST.LOUIS	ILLINOIS CENTRAL	LOUISVILLE & NASHVILLE	MISSOURI-KANSAS-TEXAS	ATCHISON, TOPEKA & SANTA FE	CHICAGO, MILWAUKEE, ST PAUL & PACIFIC
24 years	25 years	50 years	6 years	29 years	23 years
All stringers, caps, decking and curb cut to length. For steel spans, caps and grillage also bored in ballast deck, holes bored after treatment and holes filled with hot creosote	No - except sizing stringers	Frame and bore all pieces before treatment - blueprint for each piece. Drawings are standardized where possible	All material preframed and bored to blueprint	No framing except to exact lengths and surfaced to exact depths	No framing until this year. Caps and stringers now being framed
Yes	Yes	No	Yes	Yes	Not all - Use Boulton process
Yes - in emergencies, steam not to exceed 10 lb.	In emergencies only	Yes - 24 to 36 hours	No	No - except marine piling	Yes - 8 hr. for 10 lb.; 12 to 16 hr. for 15 to 30 lb. - Now treat by Boulton process
Hot creosote and galvanized iron attached to caps	Hot creosote	Hot creosote - metal covering sometimes used where cap does not cover pile	Hot creosote and tar paper	Hot creosote - then 2 coats hot sealing compound - then prepared roofing paper followed by a coat of hot sealing compound	Creosote
Yes	Yes	Yes - where pile is larger than cap	Yes	No	Try not to, but is sometimes done with large piles
Malleable iron casting called Line Brace Casting	Drift bolts	No drift bolts used. Use long bolts extending through stringers to bottom of caps and sometimes also through ties	6 drift bolts and 2 deck anchors	Drift bolts	Drift bolts
(a) One creosoted stringer in first bridge built-i.e.-after 23 years, due to cutting after treatment; also one pile after 15 years due to decay at cut-off; it had no iron cap protection (c) Some decking-excessive steaming and weathering (d) One cap crushed - defective piece of timber	Piling - decay at drift bolt extending out to within 3 or 4 in. of outside. Caps and stringers - crushing in loblolly and short leaf pine	Piles only parts that have failed (b) No decay around bolt holes (c) Have had interior decay due to injuries after treatment (e) Decayed before treatment	None so far	In beginning some failures due to piles decayed before treatment (b) } slight (c) } failures (d)- caps crushed because too many drift bolts (e)- some piles in early days	No stringer failures; a few caps failed due to crushing; some piles due to inside rot
Not before 12 years and then negligible	Complete failures in 1906 and 1907 due to poor treatment; replacements in 8 to 10 years and complete replacement in 12 to 15 years	Some failures after 8 years in caps, piles and a few stringers	None so far	Pile heads after 8 years	First installation - 1905 No replacements until 1928, 23 years for caps and piles
In timbers exposed to weather	Decay of pile heads	In caps	Probably in caps - also possibly top of pile	Pile heads and around holes bored after treatment	Piles and caps

"I am very well satisfied with the results obtained by the use of the line brace casting. All drift bolts are eliminated, consequently reducing to a minimum the number of holes to be bored in the treated timbers where decay or failure might occur.

"The extremely heavy flood of December, 1926, swept away a few of the open-deck trestles on our Swan Creek branch. The velocity and volume of the water were so great that, where the spikes which held the hook bolts to the piles did not pull out, the packing bolts running through the holes in the line brace castings either pulled through the stringers and were bent up in the shape of the letter "U," or the stringers split and failed on a line with the packing bolt holes and left the packing bolts still engaged with the casting. This was an extreme case. The performance of the castings on the whole has been very satisfactory."

I have been unable to find that any other railroad uses these castings, but I believe that the matter should be further investigated and tried. It is of the utmost importance to avoid boring creosoted timbers and any device which reduces the number of holes is worthy of further investigation.

Failures

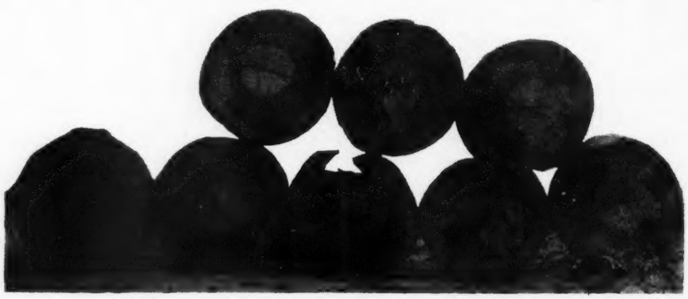
A summarized study of creosoted bridges shows failures in from 8 to 20 years, whereas, on some lines, few failures occur until after 23 years. It is interesting to note that the failures have been twofold; first, failure of the caps or other parts owing to crushing, and second, failure due to decay because of injury subsequent to treatment.

Attention is called to paragraph 8 in the accompanying summary, giving details of types of failures experienced on 10 railroads. The failure of caps (the principal item showing physical failures) can, of course, be remedied by the use of a higher grade of timber or by a change in design. Failures caused by decay will be noted as taking place largely in piles. It will also be noted that the anticipated failures on practically all of the railroads listed are shown as "decay of pile heads."

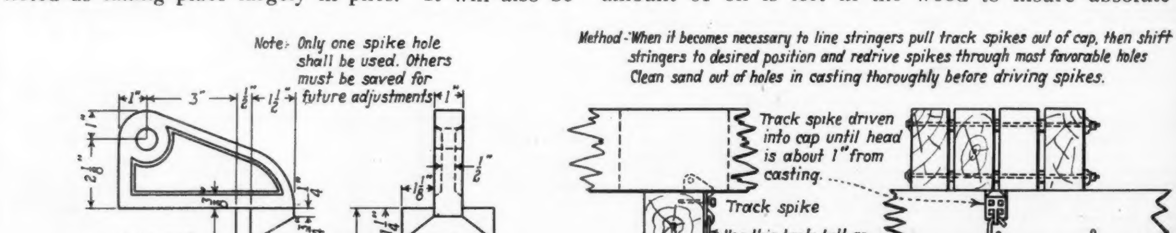
In the early days of treatment of bridge timbers (and this applies to piles, stringers, caps, etc.) what are now regarded as large quantities of creosote were used, meaning thereby 15 lb. or more per cu. ft. In the case of stringers and caps, which were sawed pieces, the wood was largely heart-wood because most of it came from long leaf pine trees which have very little sap-wood. By specifying high absorption per cubic foot, what is now known as "treatment to refusal" was given in practically every case. That this was a wise plan is shown by the remarkable service from most of these early structures, and is exemplified by the stringers in the Lake Pontchartrain trestle on the Southern, which were put in service 44 years ago and are still sound.

It has come to be generally recognized that economizing in the amount of creosote injected gives a poor risk. After much study, the A. R. E. A., two years ago, adopted a table indicating the minimum quantities to be retained for the various timbers entering into the construction of creosoted wooden bridges; emphasis is placed upon the fact that the quantities specified by the A. R. E. A. are *minimum* quantities, and also that the association specifies the full-cell process for both piles and other structural parts. It should be remembered that all treatment of piles and other structural parts should aim to get the best penetration possible and at the same time leave a minimum of 16 lb. per cu. ft. for planks, caps, stringers, longitudinal and sway braces, and, in the case of piling, a minimum of 12 lb. with less than two inches of sap-wood, or a minimum of 16 lb. for piles with more than two inches of sap-wood.

The specific emphasis on the minimum implies that the final quantity retained must be left largely to the forces under whose jurisdiction the treatment is done; in other words, treatment should be so conducted that, on the basis of an average retention of 16 lb., a sufficient amount of oil is left in the wood to insure absolute



Sections of a creosoted pile, taken every foot from the cap down, showing the nature of the decay. Incidentally, these piles received very poor treatment

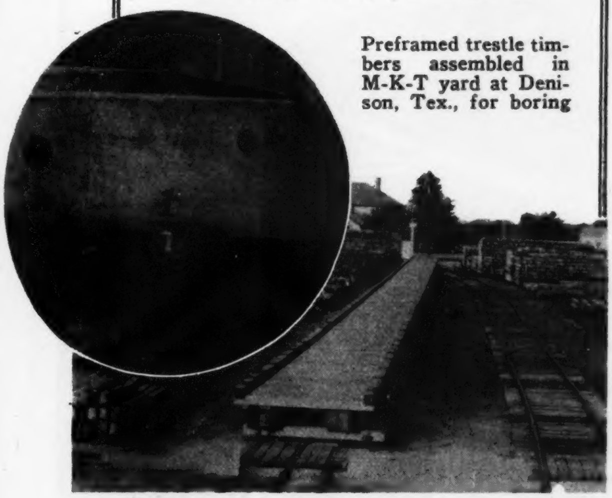


The Nashville, Chattanooga & St. Louis Uses a Line Brace Casting on its Creosoted Timber Trestles

penetration of the sap. The specifications, therefore, state that timbers should be treated to complete refusal with at least 16 lb. per cu. ft. It is a great mistake to seek to limit the creosoting plant to any definite final retention figure.

The same applies to the process to be used. While the full-cell process is recommended, occasions may arise, particularly in the case of the treatment of piling, when either the Rueping or Lowry process would give better results. This is frequently the case when, with a high sap-wood content, too high a retention would be obtained.

In the circle—Detail of a trestle constructed of creosoted timbers in which the piles decayed after four years due to improper protection of the cut-off. Note the effect of chamfering at the point marked "1."



Preframed trestle timbers assembled in M-K-T yard at Denison, Tex., for boring

Summarizing the foregoing, the best practice now provides the treatment which will give the greatest maximum penetration with a final retention calling for a minimum of 16 lb. of creosote per cu. ft., using either the full-cell, Lowry or Rueping process.

Conclusions and Recommendations

A thorough study of the subject leads to the following conclusions and recommendations:

All timbers to be used for treatment should conform to the A. R. E. A. specifications for structural timbers. In the case of high-class bridges with heavy loading, timbers conforming to code specifications numbers 4, 24 or 44 should be used; for bridges which do not require such heavy loading, codes 9, 29 or 49 should be used. In the purchase of timber, exact dimensions should be specified to avoid subsequent sawing or sizing as much as possible. When the creosoting plant is equipped with a framing mill, the specifications of rough sizes may prove to be cheaper.

All timbers, which are subsequently to be treated, should be piled properly in a yard for careful air-seasoning before treatment.

All framing should be done carefully, preferably by machine, before treatment. Whenever practical, it should be done according to a standard blue print and when the design varies from such a standard, the framing should be carried out as a special item whenever possible. By framing is meant the cutting to the exact size, and the dapping and boring of all the material.

Timbers should be treated with No. 1 A. R. E. A. straight creosote; piling with either No. 1 A. R. E. A. creosote or A. R. E. A. creosote coal-tar solution, by the full-cell process (with options to use either the Lowry or Rueping process) as per A. R. E. A. standards. The amount of creosote to be used should be strictly in accordance with the A. R. E. A. standard table of quantities, namely, a minimum of 16 lb. per cu. ft. for planks, caps, stringers, longitudinal and sway braces. Piling used for marine work should receive 22 lb. of creosote or refusal treatment. For piling with sap-wood less than two inches thick, a minimum of 12 lb. of creosote per cu. ft. and for piling with sap-wood more than two inches thick, a minimum of 16 lb. of creosote should be used.

Bridge ties should be treated by either the Lowry or the Rueping process, using A. R. E. A. standard No. 1 creosote with 10 lb. final retention per cu. ft. In all cases, the number of pounds retained should be considered as minimum quantities.

In some cases, in the treatment of stringers, caps, piles, etc., it may be necessary to use the Rueping or the Lowry process and in all treating contracts it may be found preferable to specify "either the Lowry or Rueping process" as alternatives to the full-cell process, leaving it to the treating plant to use the process best adapted to any particular class of material.

No steam treatment should be permitted, except possibly in the case of piling for marine use. Where timbers are steamed, it should be with the recognition that there will be a material reduction in strength.

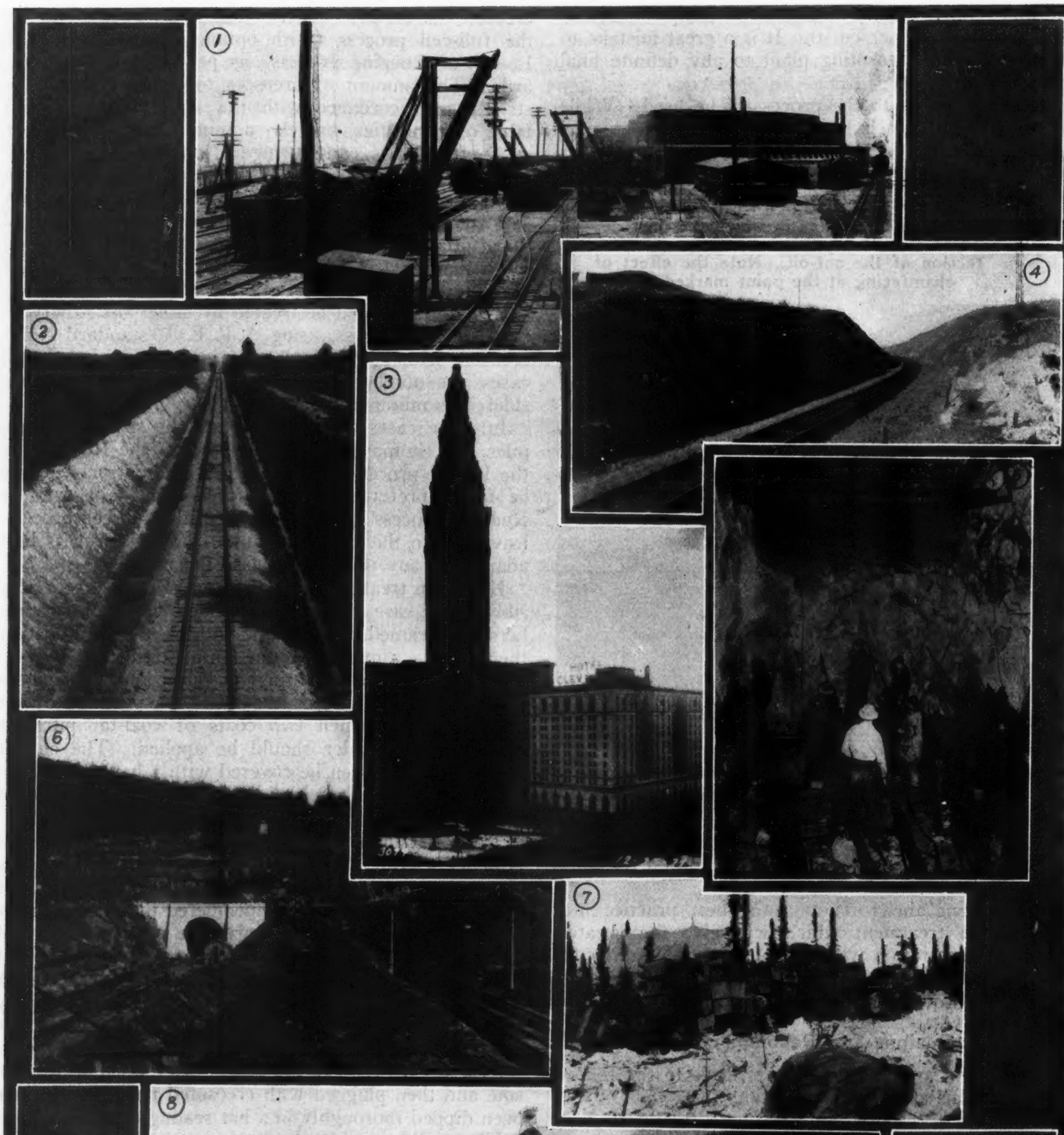
Immediately after cutting off piles, the cut surfaces should be coated with at least two separate coats of hot creosote, after which two coats of coal-tar pitch or other creosote sealer should be applied. The cut-off surfaces should then be covered with a heavy asphaltic paper, or preferably with metal caps. Piles should not be chamfered.

There should be no cutting of any bridge members after creosoting. When this must be done for any reason, the exposed surfaces should be coated with hot creosote, but it should be remembered that cutting after treatment, even with a hot creosote coating, is at best a makeshift and is likely to reduce materially the life of the piece so cut. Holes bored in creosoted pieces after treatment should be filled with hot creosote, preferably with a machine which will allow the creosote to be injected under pressure, such as the device used by the Southern Pacific. All holes should be filled with creosote and then plugged with creosoted plugs which have been dipped thoroughly in a hot sealing compound.

The nailing, spiking or boring of treated timber for the support of scaffolds should be prohibited.

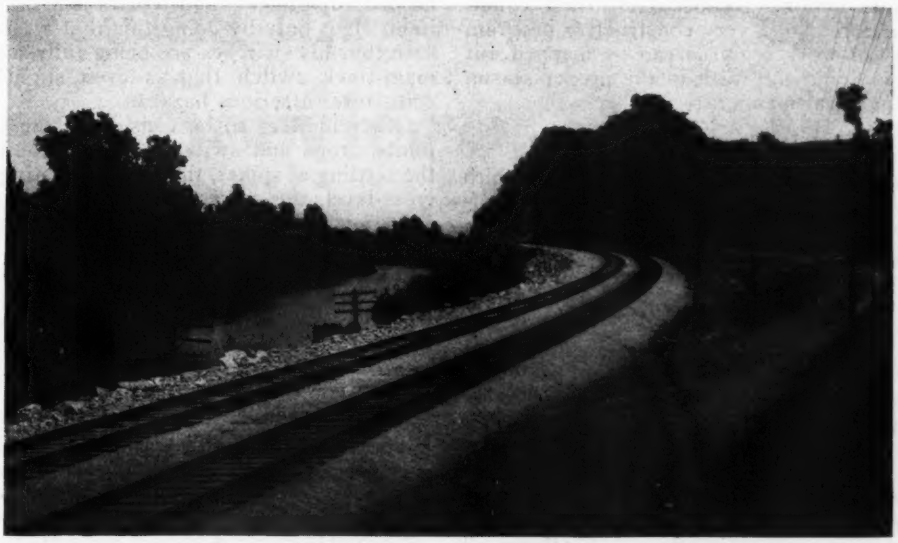
In view of the possible danger from boring holes for drift bolts, the use of line brace castings should be considered.

A Highway Grade Crossing with Modern Protection



Typical Views of Large Construction Projects Completed or in Progress During the Past Year

(1) Rebuilt and enlarged engine terminal on the Norfolk & Western at Portsmouth, Ohio. (2) Long tangent on the Edgewood line of the Illinois Central. (3) Terminal Tower building forming a part of the new Cleveland union station. (4) On the Fort Worth & Denver South Plains in Texas. (5) In the new Cascade tunnel of the Great Northern. (6) New and old Musconetcong tunnels of the Lehigh Valley. (7) Cache of supplies for construction forces on the Hudson Bay railway. (8) Coaling station and enginehouse lead tracks, Big Four Riverside (Cincinnati) terminal.



New Double Track of Missouri Pacific on Revised Location, St. Louis-Kansas City Line

Programming Section Work

as a Step Toward Efficiency

A plea for more careful planning and a statement of some of the many ways in which it will insure better results

By A. A. MILLER
Engineer Maintenance of Way, Missouri Pacific, St. Louis, Mo.

THE major items of maintenance of way and structures work have long been very carefully programmed. Bridge and building repairs and replacements, pile-driving operations, rail-laying programs, angle-bar renewals, ballasting and reballasting, fence renewals, cross and switch-tie replacement, work equipment operations, in fact, practically all classes of out-of-face work and work involving the heavier expenditures are carefully planned. As a result those classes of work are usually executed expeditiously and economically, and generally in a highly satisfactory manner.

In contrast to this careful programming of work involving the larger or more conspicuous expenditures, there is frequently a tendency to overlook the advantages of programming the more ordinary section work. The section is a comparatively small unit of the property; the force engaged is usually small—ordinarily consisting of a foreman and a few men—frequently only two or three on light-traffic districts and a somewhat greater number on the heavier-traffic lines. The demand on the time of section forces is great. They not only attend to the multitude of varied duties connected with the upkeep of their own section of track, but they are called upon to assist other forces in many jobs requiring common labor.

It Looks Like a Big Job

Owing largely, if not principally, to this frequent interference with their routine work, the average foreman and many roadmasters hesitate to program section work, entirely overlooking the fact that these same frequent interruptions and varying duties only emphasize the necessity for carefully planning the work. Such a program will actually prove the means of overcoming such handicaps, real or imaginary, as they may be experiencing, and in addition will decrease the cost of their work. A carefully prepared program will usually, if not always, mean the difference between a good section, of which both foreman and roadmaster may justly be proud, and a sorry looking and actually poor section calling for continued apology and bringing forth justly carping criticism.

In the discharge of their routine duties, roadmasters must necessarily observe and post themselves

accurately on conditions obtaining on each section under their jurisdiction. By discussing these conditions with the foreman, a very constructive program for each class of work required can be mapped out with a view to doing the work in the proper season and in an economical manner.

What It Should Cover

Such a program embraces many things, among which are included the periodical cleaning of the right-of-way and premises of scrap, refuse, rubbish, trash and all unsightly material, thus insuring a neat appearance at all times. A clean, tidy-looking section inspires the confidence of all who see it, and stimulates men to exercise their best efforts.

It implies a familiarity with state laws and city ordinances requiring the cutting of noxious weeds and the cutting of them before being ordered to do so by the authorities; and also the doing of other things of a like nature coming under such regulations. Such action will promote the good will and support of neighbors and communities, and may possibly set some good examples for others.

It requires arrangements, in advance, for the work of cutting and scalping weeds and grass under trestles and bridges and around bridge ends, buildings, signs, cattle guards, wing fences, stock-yard fences and like facilities; weed cutting in the vicinity of highway grade crossings; the cutting of all vegetation around interlocking towers, trunking leads, block signals, crossing-bell and section locations, pipe and wire lines and all connections around interlockings; cleaning the dirt and cinders off the tops of piers, bridge seats, steelwork and other readily accessible parts of steel bridges. This is work that should be done in the proper season, and, if planned for in advance, it can be done at the proper time and without neglect of other work.

It includes adequate attention to fence repairs, not only keeping the fences effective, but improving appearances. It also involves keeping the inlets and outlets of culverts, ditches and drains clean and open. This class of work demands particular attention in advance of spring freshets and fall and winter rains and snows. Unless specifically planned, it is easily overlooked or postponed—always adversely affecting the stability of the track and resulting in wholly unnecessary, if not disastrous, damage to the roadbed and track in times of heavy rainfall.

Another item is the unloading of ties in accordance with requirements, and the making of renewals progressively and in an orderly manner. Advance planning of tie renewals can frequently carry with it the correction of gage and the respacing of ties when needed, thus obtaining a distinct improvement of the track at a minimum cost if not, in fact, without any actual increase at all in cost.

It is necessary, also, to know just where each lot of ballast, particularly in small amounts, is needed for patch work, and to unload it only in accordance with the needs. Looking ahead will permit the cleaning of available good ballast, the renewal and respacing of ties, resurfacing and otherwise preparing the track for ballast application. This will result in a finished job, completed in a single operation, thereby effecting a large immediate saving in both labor and material, and an even greater future saving by having a piece of track that will not need any appreciable amount of work for a longer time than would otherwise be the case.

The regular and periodic inspection of all turnouts, switches, frogs and appurtenances and the making of needed adjustments and repairs is another important item. It is only by doing this that a foreman can be sure that his switches are being fully maintained. A main-track switch that is even slightly neglected constitutes a serious hazard.

Other matters to be considered are the oiling of joints, frogs and switches, the tightening of bolts, the settling of spikes, the periodic testing of gage and cross-level, the correcting of the alinement and the elevation of curves, the lining and surfacing of track through street and road crossings and at bridge ends, and the repair of passing, yard, wye, industry and other auxiliary tracks. In fact, it means that all worthwhile work should be programmed to the end that no job is overlooked and each job is carried out in a systematic and economical manner.

What Will Be Gained?

The advantages of programming section work, not only to the railroad but in even greater degree to the section forces themselves, is probably beyond estimate. A few of the outstanding benefits are:

A probable saving of 10 to 25 per cent in the cost of the work.

A higher standard of maintenance and superior riding track with a given force.

Freedom from trouble rather than being only a single step ahead.

The reduction or elimination of slow orders.

Better regulation of the forces, whereby the roadmaster can double his gangs for special tasks as occasion warrants without detriment to any.

Contentment rather than anxiety.

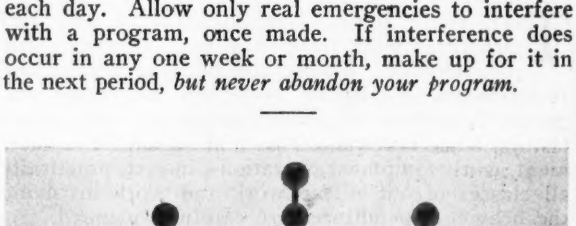
Confidence instead of misgivings.

Work well in hand so that it is rarely necessary to do the job under pressure.

Assurance that essentials will not be overlooked.

Advance knowledge of what to do and why, with a fixed objective in mind and a goal definitely set, will serve to spur all men to attainment. It will bring the esteem of their fellow men and a justifiable pride, and will invariably increase their desire for greater accomplishment. Programming of section work is worth fostering and furthering by every maintenance officer.

It is well to outline the plan in writing. Revise it from time to time if, after careful thought, new conditions justify revision; but keep the plan in operation. Set a goal for each year, each month, each week and each day. Allow only real emergencies to interfere with a program, once made. If interference does occur in any one week or month, make up for it in the next period, *but never abandon your program.*



Interlocking Signals on the M. P. at Bryant, Ark.

Getting the Most Service

*From a Rail Crane**

What one roadmaster did to get maximum use from a machine that had been assigned to his subdivision

By THOMAS WALKER
Roadmaster, Louisville & Nashville, Evansville, Ind.

Method of Blocking the Crane on the Car

FOR the last year we have been using a small gasoline-operated motor crane which weighs about 14,000 lb. and has a maximum lifting capacity of 5,000 lb., and have obtained such good results that I believe that its various uses and the manner in which it is handled are of more than local interest.

How Crane Was Loaded Before a Wire Rope Line Was Used

Our first problem upon receiving the crane was to devise a means to handle it quickly to and from a flat car on which it would be transported between stations. After much study we worked out the plan of using inclined rails, fashioned so as to permit the upper ends to be bolted to the ends of the rails on the flat car and the lower ends to rest flat on top of the side-track rails. These rails rest on three wooden trestles and the crane is drawn by its own power up the incline onto the car by means of a wire rope, one end of which is fastened to the far end of the car while the other end is wound around a winch head on the crane. Formerly, as shown in one of the views, several men were used to assist in loading the crane but with the newer method of using smaller wire rope and winding it directly around the winch head, no men are needed except the operator.

Now Use a 40-ft. Car

It will be noted in one of the photographs that the crane is being backed onto a 46-ft. flat car secured for temporary use. At present a 40-ft. car is regularly assigned to carry the crane and as the boom projects beyond the end of a 40-ft. car it is necessary to carry an idler; therefore the crane is headed onto the car to save an extra switching movement. The incline rails are loaded on the flat car by hand, which is not much of a job for about six men.

Next came the problem of blocking the crane on the car to prevent its shifting while in transit. By referring to another of the illustrations a good idea may be had of the system used. The back of the crane rests against a cross-tie which is held in place by supports permanently bolted to the car. An oak tie is placed across the rails ahead of the front wheels of the crane. Notches are cut in the tie to receive the flanges of the wheels, which prevent the tie from moving sideways and allow the treads of the wheels to rest against the tie. Two oak crossing planks are bolted to the floor of the car and two wedges of the same material extend from the ends of the planks to the oak tie. This rig holds the crane firmly in position and if any slack develops in transit it is taken up automatically by the dropping of the upper ends of the wedges. Slack which develops from wear is taken up by nailing shims to the ends of the crossing planks. After the crane is loaded, the boom is locked into place by two chains extending from the end of the boom to stake pockets on the sides of the car. About six men can load and block the crane for shipment in about thirty minutes.

The method used for getting the crane off the track is clearly illustrated in another view, and takes about three minutes. By clamping the rail tongs to one end of the main track rail and taking a strain on the load line, the rear end of the crane is lifted clear of the rail and the set-off rails are placed under the set-off wheels so that the crane can be quickly pushed clear of the main track. The set-off rails are hinged so the ends can be swung clear of the track after the crane is moved.

*From the Louisville & Nashville Employees Magazine.

By adding an extra sheave wheel below the winch head the operator of the crane can, by rigging up a rope as shown in the picture, move the crane without assistance.

The crane is used on this division primarily for laying new rail. With an operator and three or four men, it will take the place of about 18 men in laying 33-ft. 100-lb. rails, and save the labor and time of two section gangs traveling several miles to do the work. A test made last spring indicated that the crane effected a saving of about $50 per mile in laying new steel, after allowing for repairs and the operation of the crane, plus depreciation and interest on the investment.

Removing the Crane From the Track — Line Reeved Through Extra Sheave to Winch Head Permits Use of Crane Power for the Side Haul

The crane is also used to advantage in loading old rails with a work train. The crane is run to the forward end of its flat car and fastened in the same manner as when moving it. The boom then projects over the car to be loaded and the placing of rails on the car is a simple matter. It has an advantage over the air loader in that it furnishes its own power while the air loader must depend on the locomotive for power. This fact has, however, enabled us to use the two simultaneously under favorable circumstances with a work train. In such cases the locomotive, air loader and car are cut off from the train, and load rail in one place while the crane is spotted at another point to load. If the rail is all piled in one place for the crane, or the track is on a grade so that the car can be moved by hand, that is an advantage, but we have loaded rails scattered alongside the main track by pulling out the load line on the crane as far as possible and fastening it to a rail or tie. We then take a strain on the load line, which causes the crane and cars to move forward.

Also Used for Trucking Rails

Another use of this versatile machine is that of trucking rails to a siding and loading them on flat cars without the use of trains. Six laborers are needed for this operation; two for flagging and four to assist in handling the rails. Two heavy truck cars are used in tandem, and from 25 to 30 rails are trucked at a time. The crane is used for this purpose only when the trucking distance is not excessive. We have trucked and loaded rail with this crane for an average distance of about seven-tenths of a mile for $21.07 per car. The same operation by work train costs $34.20 per car.

We have also found this machine quite useful for closing up expansion in rail joints. The crane lifts a full-length rail, which is used as a battering ram to drive back the rails in the track. This allows a much more effective blow than can be struck by a gang of men using rail tongs to drag the driving rail back and forth. When closing a joint with the crane, the splices are removed from the joint and the rail to be driven is blocked up an inch or two in order to present a striking face. After the rail has been driven a sufficient amount at one place, the crane quickly carries the driving rail and men to another point for further driving. We have driven as long a stretch as 40 rails at a time without any great effort.

Experiments have been conducted with the crane to determine its value in plowing up foul rock ballast which has to be forked over and cleaned of dirt. A plow is hooked to the crane which is used merely as a tractor. So far we have made only one experiment but that one indicated that the ballast can be plowed satisfactorily and much labor saved as compared with loosening the ballast by hand picking.

We have found that the most economical way to use this crane is to plan its work ahead as far as possible so that it can be kept in service a maximum amount of time.

The amount of time required to lay new steel depends largely on the time consumed in moving the crane from one stretch of new steel to another, so in order to minimize the number of movements we made it a practice to do all the work possible at the point where the crane was stationed before moving it. We laid the new rail, picked up and piled the old rail, loaded old frogs, switches and other heavy material that was released, and did any other work that could be handled to advantage. If any of the rail released was needed at some other point and was within trucking distance of a station, the crane took it there. This saved having to do the work with a local freight and avoided much local freight overtime.

Using the Crane to Pull a Plow for Loosening Up Ballast

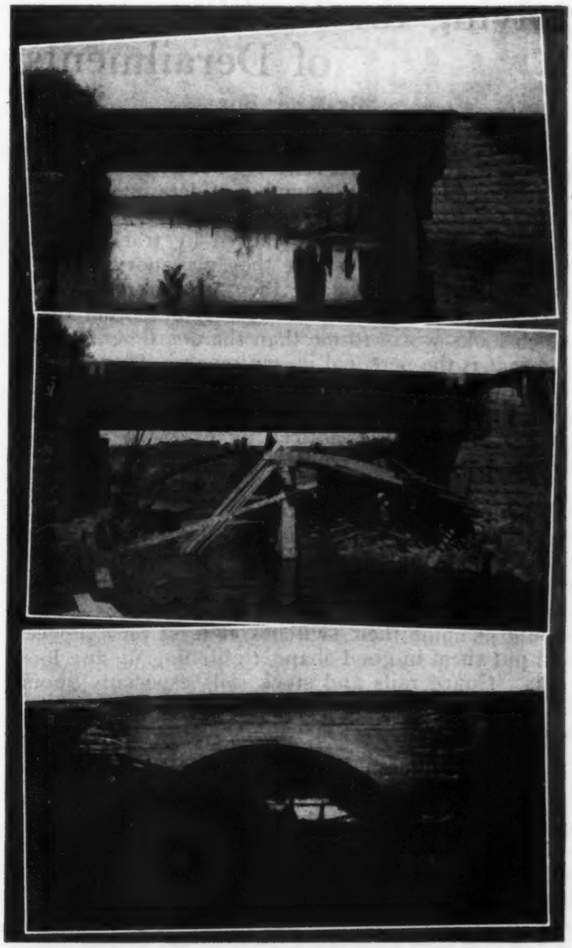
After all new steel was laid, the crane was used for laying resawed rail, second-hand rail in side tracks, loading heavy material at the storeroom, assisting the bridge department in handling heavy material, and various other odd jobs. In the fall when work for the crane was at a minimum, it was given an overhauling, repainted and put in shape for the coming year's campaign which will begin as soon as the new steel starts to move.

Employ Ingenious Plan In Rebuilding Bridge

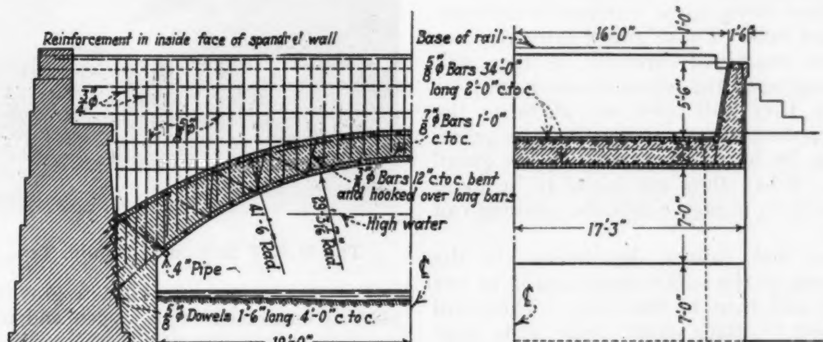
THE Chicago & Eastern Illinois recently built a 38-ft. flat concrete arch under and around a 50-ft. double-track, deck plate girder span on stone abutments near St. Anne, Ill., unusual features of which were the use of high early strength concrete in one part of the work to carry the full load three days after placing, and the construction of the arch with a minimum of falsework and without interfering with traffic.

The stone in the faces and the bridge seats of the abutments had deteriorated to such an extent as to demand extensive repairs or renewal, and it had been found necessary to block up the girders at one end on a frame bent supported on the footing offset of the abutment in order to reduce the load on the bridge seat of that abutment. After a study of the bridge, it was found that ample waterway would be provided by an arch of 38-ft. span built between the abutments with its crown low enough so that the extrados would clear the underside of the girders. This was accomplished by the use of a segmental arch with a rise of seven feet. The span of 38-ft. afforded ample space at each end for a substantial face wall of concrete in front of the stone face of each abutment, to serve as a protection and reinforcement for the abutments, although the thrust of the rather flat arch is necessarily taken largely by the old stone abutments, the faces of which were notched in steps substantially perpendicular to the arch thrust.

The design adopted is of the filled-spandrel type, which necessarily implied the placing of earth, sand or gravel filling against the faces of the old abutments above the top of the arch. It was, therefore, necessary to restore these faces of the old masonry to a good condition. To do this a second frame bent was erected next to the other abutment so that both of the bridge seats could be relieved of load while they were faced with concrete, as was done also for the faces of the abutments.



Three Views Showing Progress in Construction



Part Plan and Section of the Arch Bridge

After this was done, the girders were again permitted to bear on the bridge seats, thereby allowing both bents to be released, so that the girders alone acted as falsework to carry traffic while the arch was being built without any obstruction whatever. As it is clear from this description that further progress on the work was contingent largely on how soon the two bents could be removed, the concrete used in the bridge seats and faces of the abutments was proportioned to give a high early strength such that it could take full load in three days. The remainder of the work involved no complications and was completed without difficulty.

The design and construction of the bridges was under the direction of J. E. Bernhart, bridge engineer, Chicago & Eastern Illinois, Chicago. Construction was carried out under contract by the E. B. Styles Contracting Corporation, the railroad being represented on the ground by C. A. Garner, assistant engineer.

Solving the Problem of Derailments*

By M. A. Box

Roadmaster, Kansas City Southern, Neosha, Mo.

STATISTICS show that there has been a considerable reduction in the number of derailments on the Kansas City Southern in the last few years, but we still have quite a number caused by track failures, especially in yards. While they may not be serious and may do little damage, they are derailments and have to be reported. There is only one other report which looks worse to me than the derailment report, and that is the personal injury report. These are the most disquieting reports that I receive, and any reduction which can be made in either is an improvement which will be noticed by everyone who gets them.

Derailments caused by track conditions can be prevented in only one way, and that is by maintaining the track in good condition. To do this it is necessary to give close attention to every detail of trackwork. Most of our trouble is in yards where switching is done with road engines; here the foreman should examine their switches at least once a week, and put them in good shape, tightening up any loose bolts. Guard rails and stock rails especially should be kept up to place, and the connection and head rods must fit at all times.

Watch Kink in Stock Rail

The care of stock rails is very important where engines are working continuously. The kink in the stock rail, where the strain is the greatest at the switch point, is inclined to straighten out, allowing the point to get loose, and a few movements over a switch in this condition will result in a derailment. When it is seen that the stock rails are working back and forth they should be removed at once and properly kinked, or changed out.

Another important thing to be watched is the condition of the guard rails. Loose guard rails may not be detected unless examined carefully, as they will appear to be correct until the wheels come in contact with them, when they will open up, allowing the wheels on the opposite side to strike the frog point. These defects can be found by prying on the guard rails with a bar. When they are found to be loose it may be necessary to regage either the running rail or the guard rail.

Another defect that causes derailments is the frogs working loose in the spikes and moving to one side of the track and then to the other. They will soon get so far out of place as to create wide gage on one side and tight gage on the other and will result in derailment sooner or later. To prevent this, if both guard rails are in proper place and not loose, the frog should be gaged to the guard rail on each side and spiked firmly to prevent it from shifting either way. A loose frog is just as serious as a loose guard rail and should be kept tightened up at all times.

Track in Street Crossings

Another point to be watched is the track in street crossings. The wedging of ballast and dirt between the crossing plank and the rail causes the rail to cut into the ties and soon results in wide gage, especially where the crossings are on curves or over turnouts, and eventually causes a derailment. In order to avoid trouble of this kind, the flangeways in the crossing should be kept clean at all times and where crossings are on curves, the low rails should be kept well spiked, as they are inclined to turn over and work out of the spikes and soon permit wheels to drop through between the rails.

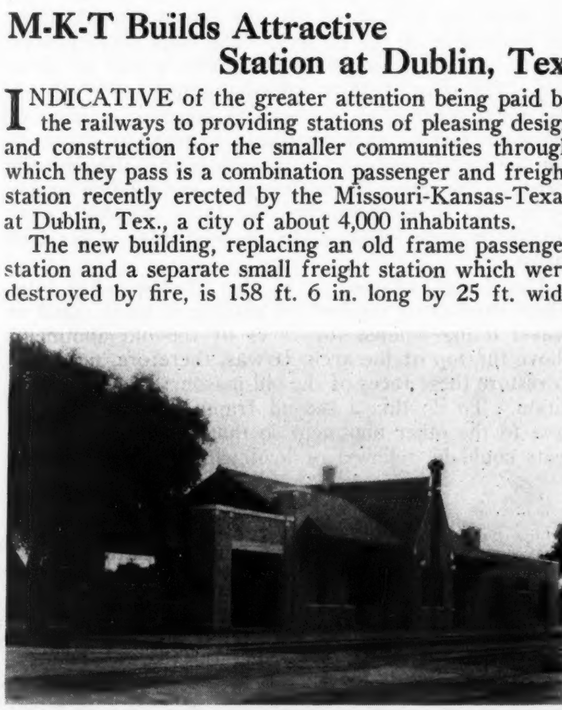
We feel sometimes that there are entirely too many things to look after; that we cannot get to all of them and get any other work done. So we may neglect them, but as surely as we do, it will result in a derailment. Then what has to be done? All of the force must then be employed for several hours, using additional material and perhaps causing the loss of a night's sleep for everyone, when if only a small per cent of this time had been put in looking after such places in advance of the derailment, time, labor and material would have been saved—without any derailment.

*A paper read before the regular monthly meeting of the Kansas City Southern Maintenance of Way Association on October 20, 1928, at Ft. Smith, Ark.

M-K-T Builds Attractive Station at Dublin, Tex.

INDICATIVE of the greater attention being paid by the railways to providing stations of pleasing design and construction for the smaller communities through which they pass is a combination passenger and freight station recently erected by the Missouri-Kansas-Texas at Dublin, Tex., a city of about 4,000 inhabitants.

The new building, replacing an old frame passenger station and a separate small freight station which were destroyed by fire, is 158 ft. 6 in. long by 25 ft. wide and is constructed of brick, a gray face brick being used in connection with stucco and a trim of precast concrete on the exterior of the walls. The roof is of red tile and the waiting room and toilet room are floored with red quarry tile, the remainder of the building having concrete floors. The waiting room walls are faced with buff enamel brick to a height of seven feet and the settees are of quarter-sawed oak. A large open waiting room with concrete settees is provided at the west end of the building, in the shade of a large live oak tree which is of historical interest in the community.



The M-K-T Station at Dublin, Tex., Is Attractive

The building is heated by a hot-water plant, the boiler for which is located back of and at a lower level than the agent's office, the space above the boiler being utilized as a record-storage room. The passenger platform is of brick with a concrete curb, while a high concrete platform is provided at the end and back of the freight storage room.

WHAT'S THE ANSWER?

Have you a question you would like to have someone answer?

Have you an answer to any of the questions listed below?

QUESTIONS TO BE ANSWERED IN THE JUNE ISSUE

1. *What bad effects, if any, result from tamping joint ties too solidly?*

2. *To what extent can ties or other timbers released from bridges be resawed economically for other uses?*

3. *What is the best method of insuring observance of restrictions on the speed of motor cars?*

4. *What are the comparative merits of the different types of pavement for use around freight houses? How do these vary with the character and amount of traffic?*

5. *What is the best time of year for removing stringers from filled trestles? What reasons lead to this conclusion?*

6. *What are the relative merits of lead and cement joints for water pipe lines, from the standpoint of maintenance?*

7. *What factors determine the economy of oiling rails to reduce curve wear? What is the minimum degree of curve and amount of traffic for which oiling is warranted?*

8. *What is the best method of handling quicksand encountered in the excavation of open cofferdams?*

Mudsills for the Ends of Trestles on New Fills

When building a new line or making a high raise of grade, what are the relative merits of mudsills and piles for end bents of trestle bridges?

Pile Bents Are Preferred

By H. Austill

Bridge Engineer, Mobile & Ohio, St. Louis, Mo.

It must be admitted, of course, that mudsills are less expensive to install. While there is merit in the contention that this form of construction often avoids the shocks which trains receive at the ends of trestles on account of the settling of the banks, I consider mudsills undesirable, especially on new construction where the settlement may run from 10 to 20 per cent and thus require continual shimming and blocking upon the sills to maintain the proper level of the end span.

Mudsills of Advantage on High Fills

By F. H. Cramer

Assistant Bridge Engineer,
Chicago, Burlington & Quincy, Chicago

When trestle bridges are built in advance of the filling on a new line, piles should be driven where the fill at the end is not exceedingly high. If the filling for the bank ends is placed in advance of the bridge building and is of medium height, long piles should be driven so that they will penetrate through the new fill into the natural ground to afford good bearing, as well as to keep the piles in line from moving forward as the fill settles. In making a high raise of grade or building high fills, mudsills should be used until such time as the fill has settled substantially. However, they should be replaced as soon as conditions will permit.

The use of mudsills requires a longer bridge in order to get a proper bearing for the timbers and during wet seasons, requires considerable maintenance expense, while with an end pile bent there is practically no maintenance cost. From my experience, an end pile bent is much more reliable and safer under all loads.

Whitewashing Cattle Guards

What are the advantages of whitewashing cattle guards and wing fences? What are the relative merits of doing this work periodically by a small special gang moving over the road on a motor car and by the section gangs?

Should Be Done by the Section Forces

By R. G. Kenly

Chief Engineer, Minneapolis & St. Louis, Minneapolis, Minn.

The advantages of whitewashing cattle guards with wing fences may be answered in four short paragraphs.

Locomotive engineers approaching crossings where cattle guards and wing fences are whitewashed, either by day or night, are effectively warned of their proximity to a highway grade crossing.

Drivers of vehicles approaching whitewashed fences at railroad crossings at grade, have their attention definitely attracted to this distinctive marking, in addition to the standard railroad crossing signs.

Cattle guards and wing fences, neatly placed and carefully whitewashed, influence track men to a higher general standard of maintenance, and lead other employees, whose attention is attracted to these well kept fences, to better service than if they were neglected.

Neatly whitewashed wing fences at cattle guards are prominent, attract attention, and favorably advertise the railroad.

We prefer to do the whitewashing with section gangs chiefly for the reason that it must be done in dry weather. If we should happen to have a rain storm shortly after the whitewash has been applied our work would be lost, and if such work was being taken care of by a small gang traveling over the road the chances are there would be no opportunity to double back to restoring whitewash where it had been destroyed by the wet weather.

Special Gang Would Secure More Uniform Results

By V. H. Shore

Yard Foreman, Atchison, Topeka & Santa Fe, Dodge City, Kan.

Cattle guards and wing fences are whitewashed principally to make a presentable appearance along the right-of-way to the public. This usually is done twice a year by western roads during the spring and fall months. When whitewash is properly mixed and applied, it also tends to protect the material from moisture to a certain extent. The work is usually done by section gangs.

In the writer's opinion, time and money could be saved and more uniform work secured by doing the whitewashing with a small special gang with a motor car. A bunk car could be provided for the use of the men doing the work and moved by local train as the foreman of the gang directed so that the men could have a place to eat and sleep. The bunk car could also serve to carry their whitewash material.

Use of Second-Hand Car Sills

To what extent and for what purpose can second-hand car sills be used to advantage by bridge and building forces?

Are Used Extensively

By Assistant Engineer Maintenance of Way

We make extensive use of second-hand car sills for many purposes. Among the principal uses may be cited stringers or joists for wooden station platforms, curbing for cinder or screening platforms, temporary cribbing for various purposes, and the construction of elevated platforms for the unloading of machinery or other heavy commodities. We also use them as ties for temporary spur tracks on which to place boarding cars. In fact, we find many uses for them in which they effect material economies, but we do not use them in exposed places for permanent work where appearance is to be considered, owing to their irregular framing. As time goes on we find more and more situations in which they can be used to advantage.

Can Be Used for Many Purposes

By Division Engineer

Second-hand car sills can be used to good advantage by bridge and building forces for a number of purposes. They are often used in the construction of storehouses for cement or for other materials and tools which must be protected from the weather, particularly on fairly large jobs where it is necessary to maintain such structures for some time. If new timber is used for these storehouses, it usually has little salvage value after the sheds are dismantled and the use of second-hand car sills for such purposes is a distinct economy.

For building forces, these sills may be used instead of new timber in the construction of platforms of various kinds, at the ground level as well as at the level of the car floor. On one occasion the writer had charge of the installation of a car-repair yard at a time when a number of obsolete cars were being dismantled. Some of these cars were torn down on the repair tracks and a service building about 100 ft. long by 30 ft. wide was constructed from the sills and siding of the dismantled cars at a marked saving as compared with the cost of new lumber.

Saw Tooth and Monitor Roofs

What are the relative merits of saw tooth and monitor roof construction from the standpoint of maintenance?

Saw Tooth Roofs Require More Maintenance

By C. E. Ettinger

Supervisor of Bridges and Buildings, Illinois Central, Chicago

As usually understood, a saw tooth roof is really a series of lean-to roofs covering a shop, provided principally to afford extra light and ventilation through windows on the vertical sides thus formed, while a monitor roof consists of a low additional story built on top of a more or less flat roof to provide light as well as ventilation. It is assumed, therefore, that the question deals with the methods of admitting outside light and air into the shop building, rather than the technical phases of the roof construction itself. In other words, we deal with skylights and ventilators.

Monitor skylight construction has been used extensively for a long time for the purpose of admitting daylight into a building from above, through skylights placed in the roof proper, ventilation being provided through louvres in the two sides or supporting portions of the monitor structure. Formerly the skylights and louvres were built principally of wood, thoroughly painted, and glazed with double strength glass.

As more attention was paid to fire prevention, skylights and ventilators were made of various kinds of sheet metal, ranging from black or galvanized iron to rolled copper. The ventilators (constructed of the same metal as the skylight proper) usually rest on square or round bases, placed at correct intervals between the skylights, thus making a complete unit, providing both light and ventilation. A combination of this kind, especially when made of rolled copper and glazed with wire glass solidly embedded in linseed-oil putty, is thoroughly waterproof and under ordinary circumstances lasts almost indefinitely with low maintenance cost, although the original installation is somewhat high.

However, complaints are occasionally registered against this type of skylight on account of the strong and glaring light that is claimed to be detrimental to the eyes. It is felt that such complaints contributed, in a way, to the development and design of the saw tooth idea as a way to overcome the objection.

The saw tooth roof has been widely adopted in recent years, as it combines both light and ventilating features, while the light is diffused, even and mild, affecting the eyes very little. Ventilation can be controlled with little trouble as the hinged sash, which can be manufactured of wood or sheet metal, are operated by control devices from the shop floor to open the windows to any angle. In case of sudden, strong winds, while the sash are wide open, the damage is also modified, as the saw tooth series of roofs act as baffles.

At times, especially after the sash-operating devices are somewhat worn, trouble may be experienced with the sash either coming down with a slam, jarring loose the putty, etc., or not fully closing and, in driving rains,

admitting water through the cracks or openings, which may damage electric and other machinery and motors located within the building.

Saw tooth construction is still in the early stages of its development. It can be rightfully assumed that a number of needed improvements will be forthcoming in the future, especially in connection with the operating devices, etc., as they play an essential part in the satisfactory maintenance of the structures.

Little Difference in Maintenance

By Assistant Engineer of Buildings

There is little difference in the relative costs of maintenance of saw tooth and monitor roofs when the work is based on the amount of skylight space of each type. The saw tooth roof is used because it provides more and better light and ventilation than can be obtained by the monitor construction. This entails a larger area of sash and glass and to that extent the maintenance of a saw tooth roof requires more work than a monitor roof, although the cost per square foot of skylight space may be no more. About the only element entering into the maintenance of the saw tooth roof which is more expensive than that of a monitor roof is the number of gutters which must be maintained with the former type.

Pressed or Solid Riser Plates?

What are the relative advantages and disadvantages of pressed and solid riser plates for switches, from the standpoints of service and effect on ties?

No Difference If Plates Are Made Properly

By G. J. Slibeck
Chief Engineer, Pettibone-Mulliken Company, Chicago

From the standpoint of price there is practically no difference in the cost of the two types. The solid riser plate is rolled to shape at the rolling mill in long lengths, and the frog and switch manufacturer simply shears the plates off to the proper width and punches the spike holes. The pressed riser plate has to be fabricated by the frog and switch manufacturer from blanks sheared from a stock plate. Great care must be exercised in the manufacture of pressed riser plates in order to get the punched portion of the plate in the right location and the dies must be watched religiously for wear in order to get square and true corners for the rail seat. The labor cost of the one, therefore, offsets the extra material in the other.

At the present time the maximum thickness to which the punched riser plate is made, is ¾ in. and this is about the limit of thickness that this can be made on account of the punching of the riser. The present maximum thickness to which the solid riser plate is made is also ¾ in.; that is, ¾ in. thickness of metal under the stock rail. Rolls for thicker sections could be made up if the future demands for heavier rail and train loads than those we are now using, but under present operating conditions ¾ in. of metal under the stock rail is more than sufficient.

The solid riser plate, where the riser extends the full width of the plate, affords a full support for the point rail and gives it a greater bearing area. The punched riser plate is limited to about 3½ in. for this support.

There is no difference in the effect on the switch tie, as far as mechanical wear is concerned, providing the punched riser plate is properly made. The same theory applies to a switch plate as to the ordinary tie plate in that the plate must be designed so that the rolling weight is distributed properly and falls in the right place.

Solid Riser Plates Are Preferred

By C. W. Baldridge
Assistant Engineer, Atchison, Topeka & Santa Fe, Chicago

At first thought one would say that the question of service was the all-controlling factor in the construction of switch slide plates, but when the fact is realized that these plates must be used on expensive switch ties, and realizing what damage to such ties may cost, it must be granted that both standpoints are to be considered.

The solid riser slide plates will generally prove more lasting and more satisfactory, for the reason that the solid riser both strengthens and stiffens the plate, while the pressed riser creates a half-sheared condition entirely around the edges of the riser with a consequent greater tendency toward breakage of the plate and a much greater frequency of failure due to the bending of the plate. Such results are not evident during the early part of the life of the plate, but as the plates grow older such failures occur, and a check of comparative installations will show the greater durability of the solid riser plates.

The effect on the ties is also likely to be in favor of the flat bottom, solid riser plate, since a switch slide plate, or riser plate, extending as it does under two rails and consequently of a large size, provides ample bearing area to minimize cutting of the tie. Since such plates usually have from four to six spikes through them, they are not subjected to much movement and are therefore less likely to cut into the ties than are the pressed plates, which provide a recessed space under the riser which does not make contact with the tie, nor provide bearing area on the tie until the rest of the base of the plate has worn or settled into the wood to a depth equal to the up thrust under the riser.

It is the writer's experience that all conditions favor the solid riser switch plates.

Use of Second-Hand Material

What is the best method of insuring that second-hand material returned to the store department or other central point may be furnished where it can be used to the best advantage?

Largely a Matter of Supervision

By K. H. Hanger
Engineer Maintenance of Way, Missouri-Kansas-Texas Lines, Dallas, Tex.

This is only a matter of supervision and is dependent on the activity of the district engineers and stores department. Proper performance is insured by insisting on a high material turnover on each district each month. This is, of course, one of the important fundamentals insisted on by the stores department and there is little trouble in enlisting their co-operation to turn material rapidly.

It is our practice, when we need materials that may be furnished from used stocks, to see first if the district engineer can supply his own needs from materials on his district; if not, we ascertain if material can be transferred from the stocks of other district engineers, and if this cannot be done the stores department is called on and used material furnished so far as that on hand permits before new material is purchased.

The system reclamation plant on these lines is a dealer

in used materials; worn and broken articles are sent there, rehabilitated and reissued; surplus stocks from districts are centered at this plant, which is under the supervision of the stores department and, as stated previously, reissued as required.

In addition to the manner of re-using second-hand material mentioned above much of our branch relaying is provided with material by direct shipment from the district or division from which rail and other material is released to the division on which the work is proposed. A large portion of our turnout requirements is supplied in this manner from used material.

As first stated, it is principally a matter of supervision to be followed constantly, and of obtaining a high district turnover which is materially aided by holding a minimum stock in the districts.

Surplus Lists Show Location on Each Division

By L. J. F. Hughes
Engineer Maintenance of Way,
Chicago, Rock Island & Pacific, Chicago

We send only scrap material to the reclamation plant and retain materials that can be used on the division on which they are released. A surplus list is made of such materials by each division, these lists being sent to the general store department, which consolidates them and issues the consolidated list to each division so that a complete inventory of second-hand materials, together with their locations, is available for all parts of the system. When new rail is to be laid, the rail to be released is assigned to a definite location and the relay rail is shipped directly to where it is to be used, together with such turnout material as is in condition for further service.

This method works well in practice and often saves time when needed second-hand material is available on nearby divisions, while it also promotes economy. The principal points to be observed in making it successful are to see that surplus second-hand material is reported for listing and to encourage the use of such material instead of new when the former will serve the purpose.

Repairing Water Service Equipment

What is the best organization for handling repairs to pumps and other water station equipment, including repairs which must be made in the shop?

Should Be Made by Maintenance of Way Forces

By R. C. Bardwell
Superintendent Water Supply, Chesapeake & Ohio,
Richmond, Va.

A suitable organization with definite responsibility for proper understanding and carrying out duties and assignments is of first importance in railway water supply work. On busy divisions it is impossible for the supervisor to give his individual attention to the many details required for water station maintenance. Where pumping plants are provided with attendants, the operator is usually held directly responsible for minor repairs to pumps and other water service equipment which can be handled conveniently in connection with his other duties. However, these positions are usually paid a low rate and in most cases it is advisable to arrange for frequent check by qualified mechanics. It has been found to be the best practice to assign definite territories to road mechanics or repairmen, which positions carry rates sufficient to hold experienced and qualified men.

These assigned territories usually include from 5 to 15 water stations, depending upon the importance, type and condition of the facilities, and the mechanic or repairman is held responsible for all running repairs of a mechanical nature, as well as for frequent detailed checks or inspections to insure proper attention and care by operator. It should be the policy to make necessary repairs in time and to keep the equipment in such shape that breakdowns and heavy repairs will be avoided. The district repairman should also keep the supervisor advised of prospective heavy repairs needed in order that arrangements can be facilitated for handling the renewals and heavy maintenances by division or system repair gangs.

In connection with repairs to pumps and general overhauling at the shops, it has been found the best practice to handle this work in the system maintenance shop or reclamation plant. It is seldom that reliable repairs to maintenance of way equipment can be obtained in mechanical department shops, which are operated for an entirely different class of work and in which maintenance of way repairs, are usually an unwelcome addition which frequently affects the quality of the work. It is strongly recommended that these heavy shop repairs to water station equipment be made where the force is under the direct jurisdiction of the maintenance of way department.

The Repairs Should Be Made In the Maintenance of Way Shops

By J. P. Hanley
Supervisor Water Service, Illinois Central, Chicago

The repairs to water service machinery are similar to repairs to other forms of maintenance of way equipment in that they are handled under two general methods, which for convenience may be called Method "A" and Method "B."

Method "A" exists when the repair shops are operated by the maintenance of way or water service department, the shops being located in suitable numbers and at such strategic points as permit the retention of a skilled crew during the entire year and also afford convenience and economy in handling the equipment to and from the shop before and after repairs.

Method "B" prevails when repairs are made in mechanical department shop and is preferred by those who favor centralization of all departments, hoping thereby for the economies that usually follow mass production.

Both methods provide that running repairs and adjustments shall be made to the machine by the water service or roadway mechanic until the unit reaches a stage of serious wear, when it shall be sent to the shop for heavy repairs by machinists, blacksmiths and other skilled mechanics. In cases where the mechanical department performs the work, the maintenance of way department is billed for the cost of labor and material plus shop overhead expense prorated for the job.

While Method "B" has been generally preferred up to recent years, I believe that Method "A" is now receiving more attention and will prove the more satisfactory under present conditions, with, of course, such exceptions as certain local conditions or personnel make advisable. Some of my reasons in favor of the maintenance of way operated shop are as follows:

(1) The rapid development and application of machine tools and labor-saving machinery by the roadway, bridge and building and water service departments create the need for a separate repair shop and personnel in many localities.

(2) The equality of pay now prevailing between maintenance of way and mechanical department me-

chanics removes the objections that formerly existed to carrying machine-shop personnel in the maintenance of way department.

(3) The maintenance of way repair shop removes many contentions existing between departments such as divided responsibility, excessive charges billed for repairs, failure to have repairs furnished on schedule or their lack of permanency. This shop also permits the maintenance of way officer to budget his repair costs to the months planned with certainty and creates better relations between the user and repairer of the equipment than exist in larger concerns or communities where the opportunities for personal contact and good will are lacking.

For these reasons I believe that it is advisable to develop the motor car repair shop, that nearly all railroads now operate, to sufficient capacity to handle repairs to all forms of maintenance of way equipment, including pumps, boilers and water service equipment.

Water service equipment should be given running repairs by the repairman until wear is such as to require shopping. It should then be sent to the shop, being replaced by a spare unit of as nearly the same size as possible. After being repaired it may, in turn, be held as a spare unit until needed or returned to the station from which it was sent, as conditions require. The expense involved in removing and resetting a heavy unit such as a boiler or steam pump is usually equal to the cost of the shop repairs and for this reason heavy repairs should be made on the ground unless a complete repair estimate warrants removal to the shop. In case of renewal, it is generally advisable to allow the replaced unit to remain as the regular unit, thereby reducing the number of installations. Electric motors, oil engines and centrifugal pumps are now preferred where possible in water station practice, which tends to simplify repair work by eliminating the heavy boilers and reciprocating pumps formerly used and makes the maintenance of present day water service equipment by a small shop entirely feasible.

Spacing Ties

When the number of ties per rail length is to be increased, either on account of a change in standards, or by reason of a change in the classification of the track, what is the most satisfactory method of effecting the change?

Can Be Done Without Raising Track

By J. B. Wilson

Section Foreman, Missouri-Kansas-Texas, Denison, Texas

The most efficient way to space ties in track so as to maintain a good surface is to give it a raise of about two inches, as it is hard to space ties in track to any considerable extent without materially affecting the surface unless the track is raised. If the work is to be performed without resurfacing, it can be done in the following manner with a minimum of disturbance to the surface.

Ordinarily the joint ties will need little if any moving if they are occupying the place that they should, and as they are the basis for the location of the rest of the ties in the panel, the location of each tie in the panel should be marked on the flange of the rail and the ties in track should be moved the shortest distance to the place where a tie is to be located.

It requires care to move old ties without injuring them and to maintain a uniform surface at the same time. The best way to do this is to remove the ballast from between the ties, being careful not to go too deep, and then to place a track jack horizontally in the center of the track, with the base of the jack against either the tie to be moved or against the tie adjacent to it, both to avoid having to remove too much ballast and also to avoid the necessity of striking the tie too heavily with a sledge. It will be found that the jack can be used in no very uniform position as regards the tie to be moved as the step of the jack will have to be placed against the solid wood in order for it to hold and the stem of the jack will have to be placed so as not to come in contact with other ties in the panel and interfere with the operation. The jack should be operated with care to prevent "humping" the track and one man should be ready with a pick to remove any ballast that may roll under the tie and cause a distortion of the surface. The tie should be struck lightly near the end outside of the rail when necessary to keep it moving uniformly along the rail but should never be struck hard enough to bruise the wood.

This method can be used with any kind of ballast; if preferred two jacks can be used, one at each end of the tie. If the track should be "humped" during the work it is well to let a train pass over it before tamping to a uniform surface and dressing the ballast.

Can Best Be Done by Raising Track

By N. F. Alberts

General Foreman, Chicago, Milwaukee & St. Paul & Pacific, Minneapolis, Minn.

When the number of ties per rail length is to be increased, the most satisfactory method of effecting the change is to make a general raise of from two to three inches, surfacing the track out of face. This will facilitate the spacing of ties in track properly and the insertion of additional ties to conform with the desired standard.

This method requires the unloading and handling of additional ballast, as in raising the track from two to three inches a lot of the old ballast is placed under the track, but in the long run, the handling of the work in this manner will prove more economical, as it not only results in perfect spacing of the ties, but tends to improve the riding quality of the track.

Give Track Slight Raise and Use Spacing Jacks

By V. H. Shore

Yard Foreman, Atchison, Topeka & Santa Fe, Dodge City, Kan.

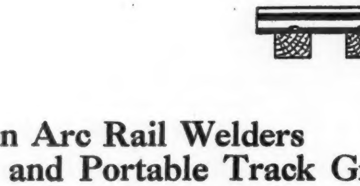
Where the number of ties per rail length is to be increased for any reason, the most satisfactory and least expensive method of making the change is by raising the track when practicable so that the ties can be re-spaced to closer centers to conform to the number of ties to be added. For example, if the change calls for two additional ties in a 33-ft. rail length that contains 18 ties, the intermediate ties will have to be spaced to 20-in. centers and the joint ties to 15½-in. centers where the intermediate ties were originally 22-in. centers. The standard centers for joint ties with 24-in. angle bars is 15½ in. for any number of ties per rail length.

The spacing of ties can be effected by means of spacing jacks or a ram at a small cost when the track is raised 1½ in. or more. Where the track is given only a light raise it is advisable to skeletonize it partly in advance of the raising, which will expedite the spacing of the ties and avoid humping the track in spacing, but if the lift is high enough to consume all the ballast for tamping, this should not be done. Care must be taken to avoid humping the track when shoving ballast ahead of the ties and part of the ballast or dirt should be removed when there is a tendency for this to occur.

New And Improved Devices

Syntron Arc Rail Welders and Portable Track Grinders

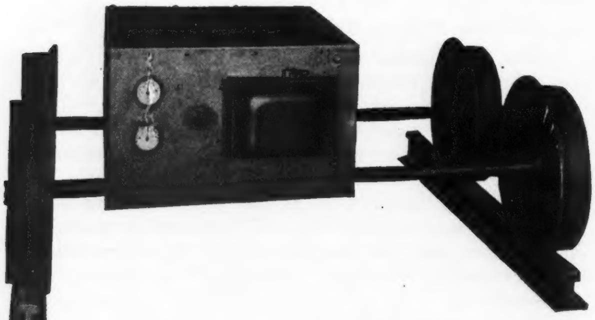
THE Syntron Company, Pittsburgh, Pa., has developed and placed on the market an electric-welding outfit for building up battered rail ends in track, as well as switches, frogs and crossings, including those made of manganese steel. The equipment consists of a portable, alternating-current electric generator driven by a gasoline engine, a long



The Hand Grinder Operates on Alternating Current

conductor cable to be stretched alongside the track to furnish current for the welder and grinder, an electric-arc welder, a track grinder mounted on a car frame for smoothing the surface of the welds and a light hand grinder for chamfering the ends of the rail to prevent chipping and end flow of metal. The power plant has sufficient capacity to operate two sets of welders and grinders at the same time, permitting more efficient organization and supervision when welding is done out of face.

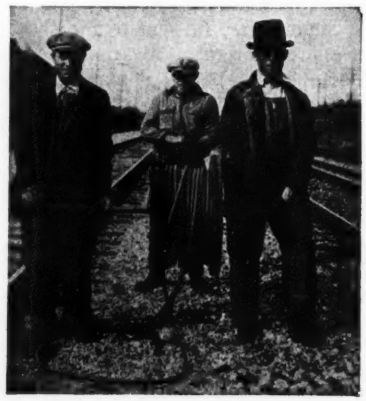
The power units are built in two forms, one being mounted on a channel iron frame with side rollers to permit it to be removed from the track easily and



The Transformer Is Mounted on Light Running Gear

with a double-flanged dolly wheel at each end to enable it to be moved on one rail by pushing on the hand rails with which it is provided, while the other is mounted on a motor car which is driven by the power unit and which may be used for the transportation of the welding gang, the deck of the car having ample space for the men and their tools.

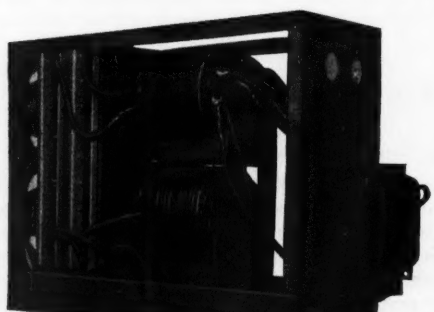
The welder uses direct current to provide a steady, even arc with the speed and power of an alternating-current arc. The current from the generator is converted to direct current by means of a multiple-tap transformer with a range up to 300 amperes, a dry-plate rectifier and a reactor in series. The panel board is provided with a control for the amperage



Unreeling the Conductor Cable

and is equipped with an ammeter and a voltmeter. The assembly is mounted on a four-wheel car frame which can be set off or on the track easily by one man.

It is said that the current from the generator can be carried a distance of half a mile through the conductor cable with little line loss, thus giving a radius



Interior View of the Transformer Case

of action of a mile from one setting of the power unit. The leads from the transformer may be 200 ft. long, which feature not only adds to the range of action from the power plant but also reduces the number of times that the connection between the conductor cable and the transformer must be changed. The transformer is so designed that there is no connection between the electrodes of two

welders working at the same time, thus permitting welding to be done on both lines of rails simultaneously without shorting or burning out the track circuit for automatic signals.

The track grinder consists of a double-spindled grinding head driven by a three-hp. a. c. squirrel-cage induction motor mounted on a traveling table to permit lateral motion while the depth to which the grinders operate is controlled by screws equipped with hand wheels. The assembly is mounted on a welded-steel car frame with four flanged wheels and the weight is such that it can be lifted easily by two men. The hand grinder has a thin grinding wheel and it, as well as the track grinder, are designed to operate on alternating current taken from the main supply cable.

Asphalt Products Used on Tracks and Bridges

ASPHALT MASTICS, as used originally in pavements and protective coverings for membrane waterproofing, were made right on the job, but the demonstrated superiority and convenience of pre-made mastics, furnished in units of various shapes and sizes, are rapidly supplanting the built-in-place product for certain purposes and are finding many new applications. For example, asphalt lumber and

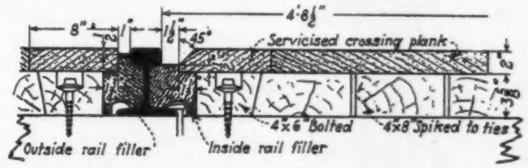
Applying Servicized Bridge Plank

certain variations of it, manufactured by the Servicized Products Corporation, Chicago, are being used as planks for highway crossings and highway bridge floors. Somewhat softer plank-like units are being applied as protection courses over waterproofing, while specially shaped pieces of still softer composition are being used as the rail fillers which form an essential feature of highway crossing construction. Still another application is cable trunking, comprising suitably shaped units having approximately the same composition as planking.

The Servicized products of this general classification are made of asphalt-saturated felts, mineral matter and fibrous materials, thoroughly impregnated with asphalt and pressed through dies while hot to provide the desired shapes. The consistency of the finished product is controlled in manufacture to meet service requirements. Bridge planking, for example, is designed to support a load of 2,225 grams on a circular area ¼ in. in diameter, for 60 sec. with a penetration of not less than 1 millimeter or more than 8 millimeters.

Planking is available in thicknesses ranging from ½ to 2 in., in steps of ¼ in. The same is true of the protection course for waterproofing, except that the minimum thickness is ¾ in. The planking runs from 6 in. to 12 in. in width and from 3 ft. to 10 ft. in length. The protection course material varies from 6 in. to 28 in. in width and from 2 ft. to 8 ft. in length.

Bridge planking is applied in substantially the same way as wood planking, being nailed to the subplanking. In general 30-d nails should be used, driving nine in a



Typical Section of the Highway Crossing Construction

five-foot plank, with a small washer under the head of the nail and sinking the head about ¼ in. below the surface with a drift hammer. After the planks are in place, open joints should be filled with hot asphalt, but no mopping or sanding is necessary. When applied on concrete surfaces, the planks are set in a swabbing of hot asphalt or emulsified asphalt.

A special application of the planking is employed in highway crossing construction. As shown in the drawing, two-inch planking is supported on sub-planking of the necessary thickness to bring the wearing surface even with the top of rail, but the special feature of the design is that the rail fillers do not form any part of the wearing surface. Thus, the flangeway is formed in part by the filler and in part by the adjacent plank which is chamfered for that purpose, but no part of the filler takes any part of the wear due to the highway traffic. This is of advantage because it permits the filler to be made softer than necessary for traffic wear and thus provide the necessary ductility for rail-filler service.

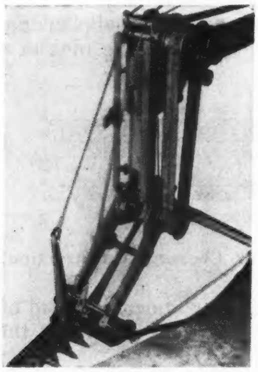
The waterproofing protection consists of planks, which, as stated before, may be had in plain edged

How the Protection Is Applied Over Membrane Waterproofing

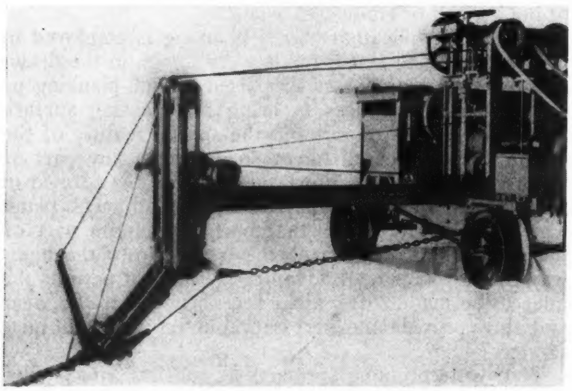
planks or in ship-lap or modified ship-lap form. It is applied as shown in one of the photographs. The planks are set in a swabbing of hot asphalt applied over the waterproofing, after which all joints are filled with asphalt. This form of protection has all the advantages of a built-in-place mastic protection, with the further advantage that it can be applied in much less time, thereby permitting restoration of traffic quickly.

Vertical Adjustment for Fairmont M24 Track Mower

FAIRMONT Railway Motors, Fairmont, Minn., has further improved its M24 track mower by providing a vertical adjustment of the power heads which permits the lowering of the inner ends of the cutter bars for use when mowing track with a high ballast section. This adjustment, which permits mowing close to the track in such places, is controlled by a hand wheel in front of each of the operators on the platform of the car, so that the height of each cutter bar may be adjusted as desired. This arrangement, together with the provision for running the power heads in or out by means of the extension beams, and the hinging of the cutter bars at their inner ends, provides three adjustments which make the machine available for a wide range of service with varying depths of ballast, widths of shoulders and slopes of earthwork. The M24 mowers are now furnished with either the vertically adjustable power heads or the fixed power head as desired.



Power Head Lowered

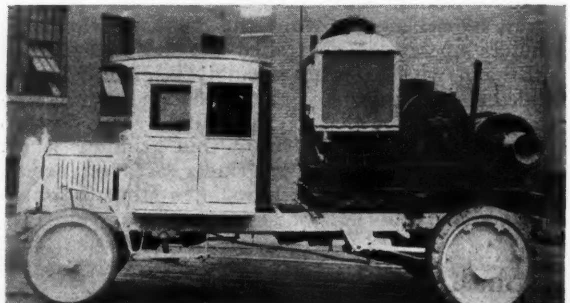


Power Head Raised for Medium Ballast Section

"American" Two-Speed Drag-Scraper Hoist

THE American Hoist & Derrick Company, St. Paul, Minn., has developed and placed on the market a two-speed drag-scraper gasoline hoist which can be mounted on a five-ton motor truck to make it readily portable for all kinds of work within its rated capacity. It is said that these hoists have shown great efficiency in dragline work.

Power is supplied by a four-cylinder Waukesha motor of 60 hp. and the hoist equipment corresponds to that of a 7-in. by 10-in. steam hoist. The front, or digging drum, has a rope capacity of 1,000 ft. of ⅝-in. rope and will pull 7,000 lb. at a speed of 190 ft. per min., while the rear, or backhaul drum, will pull 2,500 lb. at a speed of 522 ft. per min., and has a rope capacity of 1,250 ft. of ½-in. rope. A winch head is provided on the front drum. The hoist is driven by a silent chain from the motor to what would be the crankshaft on a steam hoist, the chain being fully enclosed and running in oil. The friction and brake for each drum are connected to the same lever so that when the friction is engaged, the brake is released automatically and when the brake is engaged the friction is released. The motor and drums are mounted on a frame to form a self-contained unit to preserve the alinement of all working parts. When the hoist is to be mounted on a motor truck, a special mounting of 8-in. I-beams is furnished.

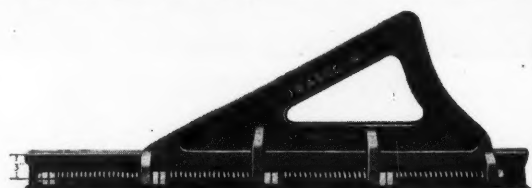


The "American" Two-Speed Hoist Mounted on a Truck

Trasco Spring-Friction Car Stop

THE Track Specialties Company, New York, has developed and placed on the market a car stop which utilizes the resistance of springs as well as the friction of the stops on the rails to prevent cars from over-running the ends of spur tracks without subjecting them to violent shocks.

This device, which is designated the Trasco spring-friction car stop, consists of an electric-steel casting for each rail with turned-down flanges on each side of the rail and with four lugs, spaced 16 in. apart, which extend down past the center of the web of the rail to engage the springs, which are carried on a rod passing through these lugs and through four special forged-steel eye-bolts. The rod is held in place by nuts, one at the forward lug on the stop and the other at an eye-bolt to the rear of the stop. A spring, 12 in. long and 2¼ in. in diameter, made of ½-in. diameter spring steel, is inserted in the space between each lug and the eye-bolt to the rear. When the stops are struck by a moving car, the lugs compress the springs against the eye-bolts, and their resistance to compression, together with the friction of the stops on the rails, is said to be sufficient to stop cars under ordinary circumstances, since it is calculated that it requires a pressure of 50,000 lb. to fully compress the springs. When full compression of the springs occurs under heavy shocks, the eye-bolts furnish further resistance to displacement.

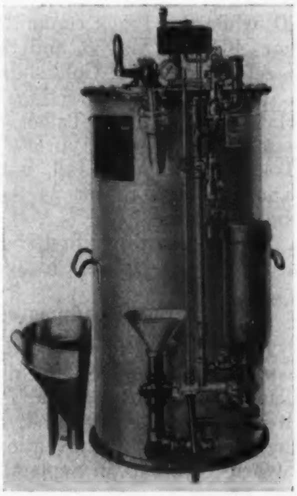


The Trasco Spring-Friction Car Stop

The car stops occupy five feet of track and, from their design, require but little labor to install, most of which consists in drilling four 1¼-in. holes in each rail for the lugs.

A New Medium-Pressure Acetylene Generator

THE Oxweld Acetylene Company, New York, has developed a medium-pressure acetylene generator, which is designated Prest-O-Weld Type MP-101, which can be used as either a stationary or portable installation for medium-pressure or low-pressure blow-pipes. The generator has an overall height of 60 in., with a width of 34 in., and weighs 305 lb. empty, or 623 lb. with a full charge of water and carbide, permitting it to be carried easily from place to place on a wagon, truck or motor car.



The Presto-O-Weld Generator

The generator was designed for safety and a minimum of fluctuation of pressure during operation. The body is made of heavy-gage material with cast-steel fittings where strength is required, the shell and fittings being joined by bronze welding. All parts are either galvanized or sheardized, according to the conditions to which they are subjected.

The carbide valve is rotated by means of a clock-spring motor which, in turn, is governed by an Oxweld diaphragm-type motor-feed control. This rotating feed valve is self-cleaning; the carbide brushing off any dust or lime deposit as it is fed, while a pin in the stem above the valve prevents bridging of the carbide and consequent possible stoppage.

Adjustment of pressure is easily made by means of a thumbscrew on the motor-feed control. Fluctuation in normal operation is said to be less than one pound per sq. in. and even under severe load, the carbide feed is regulated to limit after-generation to a maximum increase of one pound per sq. in. This close regulation permits operation of the generator close to the limit of 15 lb. per sq. in., without loss of gas through the relief valves when the blowpipes are turned off.

If both the motor-brake and relief valves fail to function for any reason, the motor locks at about 18 lb. per sq. in. pressure, thereby stopping the carbide feed. Should a broken line or leak of any kind cause the pressure to drop to zero during operation, the motor stops and will not start again except by hand. The motor is enclosed in a dust-tight housing and is easily wound with a permanently attached ratchet lever.

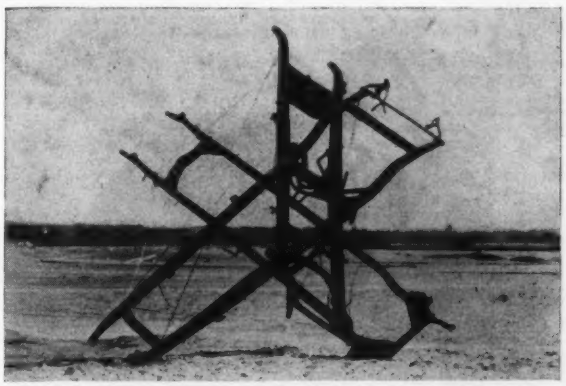
The time required for shutting down the generator, flushing and refilling with carbide and water is about 15 minutes. The relief valves are opened by raising an interference rod to vent the air-gas mixture after refilling so that it is unnecessary to vent the hose or pipe lines connected to the generator. The feed valve cone can be raised to seal the hopper when the generator is being moved, and this valve is also automatically raised, closing the hopper every time the carbide filling door is opened. The hopper and generator body are so designed that no water will enter the hopper in case the generator is knocked over. The agitator, used to facilitate the draining off of residue, is of the same type which has proved satisfactory on Oxweld duplex balance-seal generators.

The hydraulic back-pressure valve and filter are contained in a seamless drawn shell with a flange cover and outlet casting, bronze-welded to the shell. The cover can be removed for repacking the filter, when necessary, by removing eight cap screws. An interference rod permits opening the water filling cock only while the relief valves are open. The hydraulic back-pressure valve is automatically drained and refilled every time the generator water is changed. The Underwriters' Laboratories have permitted a double rating for the M. P.-101 generator, making its rated capacity 60 cu. ft. per hr, which is ample for almost any welding or cutting operation.

The carbide capacity of this generator is 30 lb. and the quarter size (¼-in. by ½-in.) carbide is used. A special funnel, which is held in place on top of the generator, is provided for filling the generator with carbide. The generator can be inclined to an angle of 30 deg. from the perpendicular without tipping. The body of the generator is painted gray, all acetylene pipes are red, and all water pipes are black.

Current Retards Made from Scrap Automobile Frames

A NOVEL use for discarded automobile frames has been evolved by H. M. Smith, Valley, Neb., who has utilized them as inexpensive and durable materials in the construction of current retards for the protection of banks where erosion occurs along silt-laden streams. Each unit is composed of three frames, wired together securely in such a manner as



An Assembled Unit

to provide a structure similar in shape to the jackstones of childhood days, this form insuring a surface to retard the current, no matter what position the unit may assume as it is placed, while wires are strung across various parts of the frames to assist in catching and holding debris. Where the object is simply to check erosion the units are anchored along the face of the bank with cables or heavy wires, but where it is desired to deflect the current as well as to restore land which has been washed away, the

units are extended in series into the stream, being anchored by large cables fastened to the bank.

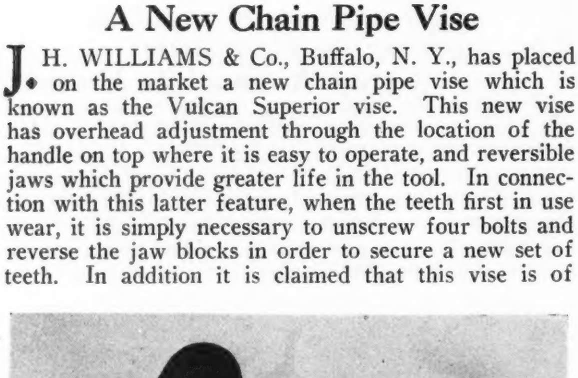
This type of bank protection, which is designated the Smith river bank protector and which is manufactured and installed by Smith & Whitmore, Valley,

Smith Bank Protectors on the U. P. Near Fullerton, Neb.

Neb., has been used by the Union Pacific on the Platte, Loup, Kaw and Blue rivers, and by the Chicago, Burlington & Quincy on the Platte and Republican rivers, where it is said to have given good results.

A New Chain Pipe Vise

J. H. WILLIAMS & Co., Buffalo, N. Y., has placed on the market a new chain pipe vise which is known as the Vulcan Superior vise. This new vise has overhead adjustment through the location of the handle on top where it is easy to operate, and reversible jaws which provide greater life in the tool. In connection with this latter feature, when the teeth first in use wear, it is simply necessary to unscrew four bolts and reverse the jaw blocks in order to secure a new set of teeth. In addition it is claimed that this vise is of



The New Vulcan Superior Pipe Wrench

greater capacity and will take pipe one-half inch larger than other chain pipe vises of similar size.

The new vise is made wholly from tough wrought steel, and is compact, rapid in action and positive in grip. It has drop-forged jaws, base, handle and chain arm, and the chain is of the same high quality as that used in Vulcan chain pipe tongs. The vise is finished in chrome-plate, is furnished in two sizes for 1/8 to 4 1/2 in. pipe, and is fully guaranteed.

With The Associations

American Railway Engineering Association

In addition to numerous meetings of committees during the convention in Chicago on March 5-7, the Committee on Masonry met in Chicago on March 14 with 20 present and the Committee on Grade Crossings in the same city on March 22. The Committee on Economics of Railway Labor will meet in Chicago on March 30, while the Track committee will meet in St. Augustine, Fla., on May 8, and the Committee on Iron and Steel Structures at Columbus, Ohio on May 16-17.

The Board of Direction has appointed Dr. W. H. Hatt and Dr. A. N. Talbot, alternates, to represent the association at the World's Engineering Congress at Tokyo, Japan next fall, with Secretary E. H. Fritch who has been chosen as the official representative of the association.

The next or thirty-first annual convention will be held at the Palmer House, Chicago, on March 11-13, 1930.

The Roadmasters Association

About twenty members, directors and officers of the association assembled for dinner, meeting with President H. R. Clarke at the Palmer House, Chicago, on Monday evening, March 4, for the purpose of discussing plans for the convention to be held at the Hotel Stevens, Chicago, in September. Secretary T. F. Donahoe presented a statement of the current status of the association's finances. President Clarke then called for progress reports from the chairmen of standing committees, and brief statements of the current status of work on their committee reports were made by G. T. Donahue, on the Selection and Training of Section Foremen; L. M. Denny, on Methods of Determining and Controlling Cross and Switch Tie Renewals; C. W. Baldridge, on Standards of Workmanship in Rail Laying; G. H. Warfel, on the Detection and Correction of Unsafe Methods in Track Work; and A. Chinn, on Methods and Costs of Weed Control and Elimination.

F. E. McAllister and L. C. Ryan, president and secretary-treasurer, respectively, of the Track Supply Association commented briefly on the plans for the exhibit for the Track Supply Association, to be held in connection with the convention in September, stating that the space available for exhibits in the Hotel Stevens will be the largest that the association has had for a number of years, affording every opportunity for a successful exhibit.

The Bridge & Building Association

Thirty members took advantage of their presence in Chicago during the convention of the A. R. E. A., to meet at luncheon at the Palmer House, on March 6, to discuss the work of the association. Attention was given particularly to the consideration of plans for the next convention, which will be held in New Orleans, La., on October 15-17. Plans are being perfected for a special train which will leave Chicago on Sunday morning, October 13, on the Illinois Central, arriving at Vicksburg, Tenn., early Monday morning, where a short stop will be made to enable the members to visit the National military park and the bridge now being built across the Mississippi river. Later that afternoon a short stop will be made at Baton Rouge, La., and the party will arrive

at New Orleans that evening. Plans are also being made for a trip, on the day following the conclusion of the convention, to the Bonnet Carre spillway which is then expected to be under construction as a part of the Mississippi River flood control project, and to the plants of the Celotex Company and some of the sugar factories.

The proceedings of the last annual convention at Boston, Mass., are now in the hands of the printers and will be distributed to the members late this month.

American Wood Preservers' Association

Members of the executive committee met at Chicago on March 6 to select the personnel of committees and transact other business. At this meeting it was decided to hold a joint meeting of the executive committee and other interested members of the association with the Committee on Wood Preservation and possibly also the Tie committee of the American Railway Engineering Association at Texarkana, Ark.-Tex., on May 21-22. At this time the members of the various committees will transact their work and then join in an inspection of the treating plants and tie and pole producing operations in that vicinity.

Chairmen were selected for the various technical committees as follow:

Preservatives—W. H. Fulweiler, Chemist, United Gas Improvement Company, Philadelphia, Pa.

Ties—E. E. Alexander, supervisor of plants, Baltimore & Ohio, Green Spring, W. Va.

Lumber—Posts—Pressure treatment—J. R. McGrenera, special tie and timber inspector, Atchison, Topeka & Santa Fe., Chicago.

Car Lumber—D. R. Elmore, assistant general manager, Fruit Growers Express Company, Washington, D. C.

Fir Lumber—R. H. Rawson, Goss & Rawson, Portland, Ore.

Inspection—J. H. Bremicker, forest inspector, Pennsylvania, Philadelphia, Pa.

Material Handling and Plant Operation—G. C. Stephenson, superintendent, Port Reading Creosoting Plant, Port Reading, N. J.

Tie Service Records—W. R. Goodwin, engineer wood preservation, Minneapolis, St. Paul & Sault Ste. Marie, Minneapolis, Minn.

Pole Service Records—H. A. Haenseler, engineering department, Western Union Telegraph Company, New York.

Posts—F. E. McCrory, chief tie inspector, Chicago, Rock Island & Pacific, Little Rock, Ark.

Boiling Treatments—J. D. MacLean, engineer in forest products, Forest Products Laboratory, Madison, Wis.

Tie Producers

The National Association of Railroad Tie Producers will hold its eleventh annual convention at the Arlington Hotel, Hot Springs, Ark., on April 23-25. The program is as follows:

Tuesday, April 23, 2 p. m.

Convention called to order by J. J. Schlafly, (President, Potosi Tie & Lumber Co., St. Louis, Mo.) acting president.

Opening Business.

Report of Secretary-Treasurer, R. M. Edmonds, St. Louis, Mo.

Address—Problems of the Field Man, Mayo Robertson, Western Tie & Lumber Co., St. Louis, Mo.

Address—Mergers and Their Effect on the Tie Business, Elmer T. Howson, editor, Railway Engineering and Maintenance, Chicago.

Report of Committee on Statistical Information, E. E. Pershall, president, T. J. Moss Tie Company, St. Louis, Chairman.

Report of Committee on Specifications for Industrial Track Ties, J. C. Fritschle, St. Louis, Mo.

Wednesday, April 24, 9:30 a. m.

Address—The Crosstie Requirements of the Electric Railways, Howard H. George, superintendent of research, Cleveland Railway Co., Cleveland, Ohio.

Address—Work of the Tie Committee, W. J. Burton, chairman, Committee on Ties, A. R. E. A., and assistant to chief engineer, M. P., St. Louis, Mo.

Address—Producers Failures from the Viewpoint of the Consumers, F. C. Krell, forester, Penna., Philadelphia, Pa.

Address—The Advantages of Uniform Tie Purchases, R. S. Belcher, manager treating plants, A. T. & S. F., Topeka. Kan.

6:30 p. m.

Annual dinner.

Thursday, April 25, 9:30 a. m.

Address—Selective Logging in Tie Operations, R. D. Carver, forester, U. S. Forest Service, Madison, Wis.

Report of Special Committees.

Reports on general conditions in the tie industry, by district officers.

Closing business.

Maintenance of Way Club

The seventh meeting for the current season was held at the Auditorium hotel on March 27, when John B. Mabile, supervisor of work equipment, Chicago, Rock Island & Pacific, presented a paper on the maintenance and operation of labor-saving machinery and tools.

Metropolitan Supervisors' Club

The next meeting of the Metropolitan Track Supervisors' Club will be held on April 11 at Keen's Chop House, 72 West Thirty-sixth street, New York City, at 1:00 p. m. At this meeting a report on The Maintenance of Track Joints will be presented by a committee of which Mr. W. A. Clark is chairman.

Directory of Associations

American Railway Bridge and Building Association—C. A. Lichty, secretary, 319 North Waller avenue, Chicago. Next convention, October 15-17, 1929, New Orleans, La.

American Railway Engineering Association (Works in co-operation with the American Railway Association, Division IV).—E. H. Fritch, secretary, 431 South Dearborn street, Chicago. Next convention, March 11-13, 1930, Palmer House, Chicago.

American Wood-Preservers' Association, H. L. Dawson, secretary, 228 North La Salle street, Chicago. Next convention, January 28-30, 1930, Seattle, Wash.

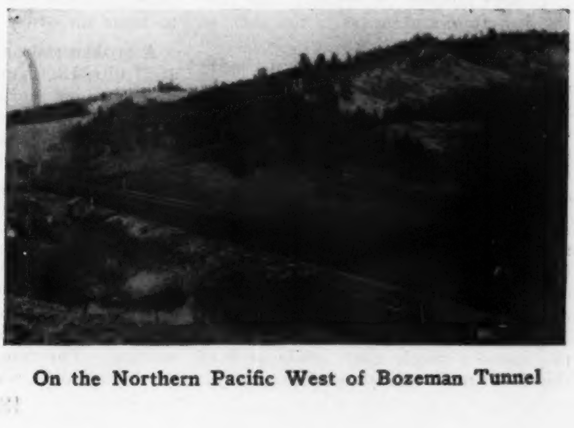
Bridge and Building Supply Men's Association.—W. D. Waugh, secretary, Detroit Graphite Company, Railway Exchange Building, St. Louis, Mo. Annual exhibit at convention of American Railway Bridge and Building Association.

National Association of Railroad Tie Producers—Roy M. Edmonds, secretary, Syndicate Trust Building, St. Louis, Mo. Next convention, April 23-25, 1929, Arlington Hotel, Hot Springs, Ark.

National Railway Appliances Association.—C. W. Kelly, secretary, 1014 South Michigan avenue, Chicago. Annual exhibit during convention of American Railway Engineering Association.

Roadmasters' and Maintenance of Way Association.—T. F. Donahoe, secretary, 428 Mansion street, Pittsburgh, Pa. Next convention, September 17-19, 1929, Chicago.

Track Supply Association—L. C. Ryan, secretary, Oxweld Railroad Service Company, Chicago. Annual exhibit at convention of Roadmasters' and Maintenance of Way Association.



On the Northern Pacific West of Bozeman Tunnel

RAILWAY NEWS BRIEFLY TOLD

The pension rolls of the New York Central Lines now bear 4,460 names, about three per cent of the total working force of 160,217. Since the adoption of the plan on January 11, 1910, the New York Central Lines have paid pensions aggregating $19,504,333.

The railroads operating through passenger service from Chicago to the Pacific Northwest will reduce the running time of their fast trains from 68 to 63 hours, effective in the early part of the summer, in response to an appeal from various interests of that section who asked for a 60-hr. schedule.

Through traffic between Calgary, Alta., and Vancouver, B. C., was interrupted from January 28 to February 17 by the failure of a bridge over Surprise creek at Cut Bank, B. C. A new steel bridge, 200-ft. long, was erected during this period, with the temperature from zero to 40 deg. below.

Revenue freight car loading for the week ending March 16 totaled 957,460 cars, an increase of 15,374 over the corresponding week in 1928, but a decrease of 44,162 as compared with 1927. The cumulative total for the first 11 weeks of the current year was 10,213,046, as compared with 9,890,583 and 10,551,127 in the corresponding periods of 1928 and 1927, respectively.

The 20-hour trains between Chicago and New York on both the New York Central and the Pennsylvania will be run on daylight-saving time, effective April 28. The leaving and arriving times will be the same as at present at each terminus, the change being made to adjust the arrival and departure to daylight-saving time which will then be in effect in both Chicago and New York.

O. B. Colquitt, former governor of Texas, has been recommended to President Hoover by senators and others for appointment as a member of the United States Board of Mediation to succeed Paul M. Neff, whose reappointment was not confirmed by the Senate, owing to objections made by the railroad labor organizations after the Senate committee on interstate commerce had voted a favorable report on his confirmation.

The statement of the Canadian National that the repainting of the Quebec bridge across the St. Lawrence river is one of the largest paint jobs on any railway, is borne out by the fact that 7,500 gal. of paint are required to give the spans a single coat, while each of the four main piers requires 70 gal. additional. The time required to paint the bridge covers three years, 35 men working steadily from June 15 to September 15 each year.

The Canadian National has accepted an offer of co-operative arrangements extended by the Brotherhood of Maintenance of Way employees and the plan will be put into operation immediately on the Moncton division, later being extended over the entire system. This agreemnt follows the successful operation of the co-operative arrangement between the union and the management (the so-called Baltimore & Ohio plan) in the maintenance of equipment department.

"Goggles Do Save Eyes" is the heading of circular No. 216, which L. G. Bentley, chairman of the Committee on Education of the Safety Section of the A. R. A., has issued for the use of safety committees during April. The feature of the circular is a picture of a distressed girl whose father was injured by being struck in the eye by a splinter of steel while chipping metal without wearing his goggles. The little girl asked questions to which careless workmen are unable to give satisfactory answers.

The Court of Appeals of the District of Columbia has decided that the Interstate Commerce Commission was in error in holding that it had no power to order the railways serving Los Angeles, Cal., to build a union station. The case has been in litigation for several years, efforts having been made to compel the railways to build the station by an order of the California commission, which was held invalid by the courts. Later, the Interstate Commerce Commission held that the construction of the station would be in the public interest but that it had no power to issue an order for its construction.

A broken rail on the Peoria Terminal at Hollis, Ill., caused the derailment of a passenger train on February 20, which resulted in the death of five passengers and injuries to 125 others. The train, which consisted of eight wooden coaches, was carrying miners on their way to work and was running at a speed of from 20 to 25 miles an hour at the time of the accident. All of the deaths and serious injuries were in four coaches which were thrown down a 25-ft. embankment after being derailed. The broken rail was of 60-lb. section. The temperature at the time of the accident was 7 deg. below zero, the extreme cold being a contributing cause to the breaking of the rail.

The New York City Transit Commission has approved an order for the removal of the 93 grade crossings which remain on the New York Central on the west side of Manhattan between St. John's Park (Beach street) and West 158th street, including the tracks along Twelfth avenue. The order was made contingent upon agreement between the railroad and the city on the proposed plan for improvement of the west side river front. In the order the cost of grade elimination work is set at $30,700,000, of which $12,280,000 will be paid by the state, $3,070, by the city and $15,350,000 by the railroad.

Overflows from streams in southern Alabama on March 14 caused serious interruptions to traffic on the railways in that territory. The main line of the Louisville & Nashville between Montgomery and Mobile was submerged to a depth of 12 ft. or more for a distance of 12 miles, north of Evergreen, Ala., while from two miles south of Evergreen to four miles north of Flomaton, a distance of 32 miles, the water covered the track to a depth of from 8 to 25 ft. Service was also interfered with on several branches north of Montgomery. On the Seaboard Air Line train service was suspended for several days between Montgomery, Ala., and Americus, Ga., while the Central of Georgia suffered from washouts on its lines to Andalusia, Ala., Lockhard and Ozark.

In a suit for damages against the Delaware, Lackawanna & Western, brought by an employee of that company whose duty it was to fill the sand boxes on locomotives and who was injured when he jumped from an engine and fell into an uncovered drain between the tracks, the Supreme Court of the United States held that, the conditions being constant and of long standing, of which the plaintiff was aware, the dangers attending the jumping from engines, especially in the dark were obvious and that the railroad was entitled to a directed verdict. In its decision, the court said: "The defendant had much freedom in the selection of methods to drain its yard and in the choice of facilities and places for the use of its employees. Courts will not prescribe standards in respect of such matters or leave engineering questions such as are involved in the construction and maintenance of railroad yards and their drainage systems to the uncertain and varying judgments of juries.

Construction News

The Atchison, Topeka & Santa Fe has awarded a contract for the construction of a steel car repair shed at Richmond, Cal., which will have outside dimensions of 75 ft. by 800 ft., to the Clinton Construction Company, San Francisco, Cal.

This company contemplates the construction of an extension of the Kansas City, Mexico & Orient from San Angelo, Tex., to Sonora, 65 miles.

A contract has been awarded to the Lone Star Construction Company, San Antonio, Tex., for the construction of an extension of the Cane Belt from Lane City, Tex., to Guy, 18 miles.

A contract has been let to Joseph E. Nelson & Sons, Chicago, for the construction of fuel oil pipe lines and facilities for supplying locomotives at Emporia, Kan.

The Bangor & Aroostook has awarded a contract to the Roberts & Schaefer Company for the construction of an 80-ton reinforced concrete Simplex coaling plant with weighing facilities and ground storage facilities at Derby, Me.

The Boston & Maine plans the construction of a new 16-story, 500-room modern hotel building to connect with the new North Station in Boston, Mass. The hotel building will cost approximately $2,500,000 and will be finished in buff brick, trimmed with stone to harmonize with the other buildings in the group.

The Canadian National plans the reconstruction of its car shop at Melville, Sask., which was recently destroyed by fire.

This road is contemplating an expenditure of about $1,000,000 for the construction of new yards and terminal buildings, including shops at Tecumseh, Ont. It also proposes to build an industrial spur about four miles long with sidings on its line at Walkerville, Ont., at an estimated cost of $500,000. The latter project will be carried out by company forces.

The Canadian Pacific has awarded the general contract for the construction of a 270-room addition to the Empress hotel, Victoria, B. C., to the Carter-Halls-Aldinger Company, Winnipeg, Man. The contract for the steel work has been awarded to the Dominion Bridge Company, Winnipeg. A conract for the construction of a four-story addition to the Palliser hotel, Calgary, Alta., has also been let to the Carter-Halls-Aldinger Company.

The Chesapeake & Ohio has awarded a contract to the United Engineers & Constructors, Philadelphia, Pa., for locomotive shop improvements at Huntington, W. Va., estimated to cost $3,493,400. Other contracts have been awarded as follows: To the Hughes-Foulkrod Company, Pittsburgh, Pa., for the construction of new freight car shops at Russell, Ky., estimated to cost $3,162,000; to J. T. Nuckols, Richmond, Va., for the building of a new freight house at Covington, Ky., to cost about $97,500; to L. W. Hancock, Louisville, Ky., for work in connection with engine terminal improvements at Stevens, Ky.; to Board & Board, Charleston, W. Va., for grading and masonry work in preparation for the laying of a third track between Barboursville and Guyondot, W. Va., the entire project to cost about $801,813; to Hunt Forbes Construction Company, Huntington, W. Va., for grading and masonry work for a new third track between Huntington and Kenova, W. Va.; to J. H. Montague, Richmond, Va., for grading work for track changes in connection with engine terminal improvements at Fulton, Va., and to Joseph E. Nelson & Sons, Chicago, for the construction of an addition to a roundhouse, a storehouse, a coaling station and other buildings at Fulton.

The Chicago, Rock Island & Pacific plans to file with the Interstate Commerce Commission an application for permission to construct an extension from Groom, Tex., to Paducah, 97 miles.

A contract has been awarded to the Roberts & Schaefer Company, Chicago, for the construction of a 600-ton automatic electric three track coaling station with sanding facilities at Herington, Kan., to replace a wooden structure which was destroyed by fire.

The Cleveland, Cincinnati, Chicago & St. Louis has let a contract to the Ellington Miller Company, Chicago, for the construction of terminal improvements at Linndale (Cleveland), Ohio, involving an expenditure of approximately $200,000.

The Erie's budget for 1929 includes the following projects: Re-arrangement of water lines, the construction of a new sewerage system and the installation of a new main track coaling station in Meadville, Pa., to cost approximately $443,000; extensions and improvements to car shops at Susquehanna, Pa., to cost, with equipment, about $378,000; construction of additional yard facilities at Shenango, Pa., to handle interchange business with the Bessemer & Lake Erie, at an estimated cost of $90,000, and the installation of a new turntable, 120 ft. long, costing $50,000, at Ferrona, Pa.

The Grand Trunk Western has let a contract for the construction of the substructure for a bascule bridge over the Black river at Port Huron, Mich., to the R. C. Huffman Construction Company, Cleveland, Ohio.

The Great Northern has applied to the Interstate Commerce Commission for authority to build an extension south from Klamath Falls, Ore., about 80 miles, to meet an extension proposed by the Western Pacific north from Paxton or Keddie, Cal., which would give the Great Northern access to San Francisco via the Western Pacific.

A contract has been awarded the Ogle Construction Company for the construction of two 500-ton capacity, three-track, electrically-operated, steel coaling stations; one to be constructed at Williston, N. D., and another at Whitefish, Mont.

The Louisville & Nashville has awarded contracts and work has been started on a new warehouse on the water front at Pensacola, Fla. The building will be 102 ft. by 402 ft. This is a part of the $500,000 improvement project which this road has planned for its dock and storage facilities at Pensacola.

The Missouri Southern has been authorized by the Interstate Commerce Commission to construct an 18-mile extension in Reynolds and Shannon counties, Mo., at an estimated cost of $167,200.

The Mobile & Ohio has awarded a contract for the construction of an 18-stall roundhouse and other buildings, at East St. Louis, Ill., to the Ellington-Miller Company, Chicago, at an estimated cost of $180,000.

The National Railways of Mexico have begun the substructure of a bridge at Cuatotolopan, Ver. C., to replace a bridge destroyed by high water. Company forces are also constructing a bridge near Ocotlan, Jal., which was partially destroyed by floods. The total cost of the work is estimated at $142,000. The American Bridge Company, Chicago, has the contract for the superstructure.

The Pennsylvania has awarded a contract to the Dravo Contracting Company, Pittsburgh, Pa., for the construction of masonry for the renewal of a bridge near Gnadenhutten, O., at a cost of about $130,000. A contract also has been awarded to the McNichol Paving & Construction Company, Philadelphia, Pa., for the construction of bridges over four streets and other work in connection with the South Philadelphia improvement program. This work will cost approximately $300,000.

The St. Louis-San Francisco has awarded a contract for the construction of second main track between Clarksdale, Ark., and Harvard, 5 miles, to Reid & Lowe, Birmingham, Ala., at a cost of about $317,000.

The Toledo Terminal has awarded a contract for the construction of a double track movable bridge over the Maumee river at Toledo, Ohio, to the American Bridge Company, Chicago, at a cost of about $1,000,000.

The Southern Pacific has awarded contracts for the construction of the bridge over Suisun bay between Martinez, Cal., and Army Point to Siems, Helmers and Shaffner, Inc., St. Paul, Minn., for the foundation work and to the American Bridge Company for the superstructure. The cost of the bridge will be about $12,000,000.

Supply Trade News

General

The Bates Valve Bag Corporation, Chicago, has been acquired by the St. Regis Paper Company, and the business will be carried on as a wholly-owned subsidiary of the latter company, with no change in corporate title.

The Bucyrus-Erie Company, South Milwaukee, Wis., has moved its Chicago district office to 105 West Adams street, Chicago. **A. R. Hance** will be in charge of machines of more than 1¼ cu. yd. capacity, while **W. K. Fawcett** will handle the smaller machines.

A. W. French & Co., Chicago, has been merged with the Blaw-Knox Company, Pittsburgh, Pa. The personnel and policies of the former company will continue as heretofore and its plant and sales organization will function as a separate division of the Blaw-Knox Company.

The Philip Carey Manufacturing Company, Lockland, Ohio, and the Servicized Products Corporation, Chicago, have terminated their differences, including pending litigation, and the Servicized Products Corporation was granted, as of December 12, 1928, and is now manufacturing premoulded products under a license on patents owned by the Philip Carey Manufacturing Company, including, in addition to patents formerly owned by that company, all patents heretofore owned by the Servicized Laboratories, Inc., relating to premoulded products, such as expansion joint, rail filler, track pavement, railroad crossings, construction materials and other like products. Other than as above stated, the two companies are entirely distinct and independent corporations.

Personal

H. H. Wood, formerly chief engineer of the Laclede Steel Company, St. Louis, Mo., has become connected with the industrial department of the Timken Roller Bearing Company, Canton, Ohio, with headquarters for the present at Canton.

E. C. Afflerbach has been appointed district sales representative in Texas for the Woodings Forge & Tool Company, Verona, Pa., with headquarters in the Second National Bank Building, Houston, Tex., and **Denyven & Linn,** 250 Stuart street, Boston, Mass., have been appointed district sales representative in the New England States.

C. L. Pierce, Jr., vice-president of Hubbard & Co., Pittsburgh, Pa., has been elected president to succeed **John W. Hubbard,** who has been elected chairman of the board. **Joseph V. Smith,** manager of the Pittsburgh factory, has been elected vice-president in charge of the electrical division, and **W. R. Pounder,** manager, has also been elected a vice-president. **C. H. Keen,** New England sales representative, has been promoted to sales manager of the New York district to succeed **W. W. Glosser,** who has been promoted to Pacific Coast manager. **R. M. Waggoner,** sales engineer, and **R. G. Robbins,** advertising manager, both with headquarters at Pittsburgh, have been promoted to assistant sales managers.

Myron C. Atwood, president and general manager of the Western Wheeled Scraper Company, Aurora, Ill., died in that city on February 26, after a lingering illness. Mr. Atwood was born

Myron C. Atwood

on August 24, 1863, in Kane county, Ill., and entered railway service in 1880 as a ticket agent and operator on the Chicago, Burlington & Quincy, later serving as agent at Earlville, Ill., and Ottawa. In January, 1892, he was promoted to commercial agent at Aurora, and on October, 1903, he was appointed superintendent of the Fulton County Narrow Gage (a subsidiary of the Burlington.) In 1905 he was elected also vice-president of that road, retaining these positions until 1906, when he resigned to become assistant manager of the Western Wheeled Scraper Company. He was promoted to general manager in 1910 and in 1925 was elected president and general manager, which position he was holding at the time of his death.

William R. Seigle, vice-president in charge of mines and factories of the Johns-Manville Corporation, New York, has been elected chairman of the board of directors to succeed **H. E. Manville,** who has resigned, and **Lewis H. Brown,** secretary and assistant to the president, has been elected president to succeed **Theodore F. Merseles,** notice of whose death will be found elsewhere in these columns.

Mr. Seigle was born in 1879 at Easton, Pa., and has been in the service of the Johns-Manville Corporation and its predecessor company since his graduation from college in 1900, where his technical training covered the fields of mechanical and electrical engineering as well as electro-chemistry, which enabled him to develop many of the materials on which the company has based its success.

Mr. Brown was born in 1894 at Creston, Iowa, and was educated at the University of Iowa. After graduation he became a salesman and assistant to the sales manager of a manufacturing company in Indiana. During the World War he served for two years as a captain of infantry in the 84th division and as a staff officer at the A. E. F. headquarters in France. Immediately after the war he became connected with Montgomery Ward & Co., where he served as office manager, superintendent of merchandise and assistant general operating manager. In 1927 he was appointed assistant to the president of the Johns-Manville Corporation, which position he was holding at the time of his recent election to the presidency of that concern.

Theodore F. Merseles, president of the Johns-Manville Corporation, New York, died suddenly on March 6 at Del Monte, Cal. Mr. Merseles was born on August 17, 1863, at Jersey City, N. J., and entered railway service as a clerk with the Pennsylvania in that city, later becoming a clerk for the Trunk Line Association in New York. He then became manager and vice-president of the Western Wheel Works at Chicago, and in 1899 participated in the organization of the American Bicycle Company of New York, of which he was made vice-president. In 1903 he became general manager of the National Cloak & Suit Company, a mail order concern, at New York, leaving that

Theodore F. Merseles

position in 1921 to become president of Montgomery Ward & Company. Mr. Merseles was elected president of the Johns-Manville Corporation in 1927 and was holding that position at the time of his death.

P. B. Bird, president of the Bird-Archer Company, Chicago, has been elected chairman of the board of directors, with headquarters at 1 East Forty-second street, New York, and will continue actively in charge of policy and finance. **L. F. Wilson,** vice-president and general manager, has been elected president and general manager, in charge of the general operation of the company,

with headquarters at Chicago. **W. E. Ridenour** has been elected executive vice-president with office at Philadelphia, Pa., his duties to include those of chief chemist as heretofore. **C. A. Bird** has been elected secretary with office at New York. **H. C. Harragin** has been appointed district manager with office at New York, in charge of operations in the eastern section of the United States, reporting to the general manager. **T. A. Peacock** has been appointed district manager with office at Winnipeg, Man., in charge of operations throughout Canada, reporting to the general manager. **S. P. Foster** has been appointed assistant to the president with office at Chicago and combines the duties of chemical engineer with the duties of assistant to the president.

H. J. Clarity has been appointed representative of the Lehon Company, Chicago, with headquarters at 419 South Fourth street, Minneapolis, Minn. and **Henry W. Dickerson** has been appointed representative at Richmond, Va., with headquarters at 923 Mutual building.

Trade Publications

Fissures in Steel Rails.—The Robert W. Hunt Company, engineers, Chicago, Ill., has issued a card, 14 in. by 11 in., illustrating and describing internal fissures in rails, including those of the transverse, horizontal and compound types.

Boyer Riveting Hammers.—An eight-page bulletin, No. SP-1694, has been issued by the Chicago Pneumatic Tool Company, New York, describing the Boyer riveting hammers produced by that concern, with special reference to the improved valve unit which is now furnished as regular equipment with these tools.

Rotary Pumps.—The Geo. D. Roper Corporation, Rockford, Ill., has issued an 80-page, loose-leaf catalog describing the Trahern rotary pumps manufactured by that company for railway use as well as for other purposes. Each type of pump is shown in illustrations together with curves showing capacity and horsepower performance, while views are given of numerous installations.

Fairmont Line Book.—Fairmont Railway Motors, Inc., has issued a 22-page booklet listing and describing the Fairmont and Mudge motor cars and other self-propelled labor-saving devices manufactured by that company.

Shallow-Pit Coaling Plants.—The Roberts & Schaefer Company, Chicago, has issued Bulletin No. 115, an eight-page booklet illustrating and describing its shallow-pit coaling plants, in which an elevating bucket receives coal automatically from a track hopper, this feature, together with a Cutter-Hammer controller, insuring automatic operation of the plant after it has been started.

Personal Mention

General

W. R. Bennett, assistant chief engineer of the Wabash, with headquarters at St Louis, Mo., has been promoted to assistant to the president, with headquarters in the same city.

T. J. Quigley, superintendent of the Illinois division of the Illinois Central, with headquarters at Champaign, Ill.,

T. J. Quigley

and an engineer by training and experience, has been promoted to general superintendent of the Southern lines, with headquarters at New Orleans, La. Mr. Quigley was born on February 4, 1883, at Paducah, Ky., and was educated at the Virginia Military Institute, where he graduated in 1904. He entered railway service on January 1, 1905, as a track apprentice on the Illinois Central, and was promoted successively to chainman, rodman, resident engineer, assistant engineer, supervisor and assistant roadmaster until 1914, when he was promoted to roadmaster at McComb, Miss. Mr. Quigley entered the operating department in 1917 as trainmaster at McComb and in 1919 was promoted to superintendent of the Louisiana division, with headquarters at the same point. In 1926 he was transferred to the Illinois division, with headquarters at Champaign, where he was serving as superintendent at the time of his recent promotion to general superintendent of the Southern lines.

Chester K. Smith, assistant engineer on the Union Pacific, has been promoted to special representative of the president, with headquarters at Omaha, Neb. Mr. Smith was born on March 26, 1885, at Bloomington, Ill., where he completed the engineering course in 1907. He entered railway service in the same year as a draftsman on the Panama Railroad and later was promoted to chief draftsman. He was engaged in smelter construction in South America and on irrigation work in Oregon from 1908 to 1911, returning to railroad service in the latter year as assistant bridge engineer of the Spokane, Portland & Seattle, later being promoted to bridge engineer. Mr. Smith entered military service in 1917 as lieutenant of engineers and was advanced successively to captain and major, serving overseas on railroad and dock construction from August, 1917, to January, 1919. In March, 1919, he entered the service of the U. S. Railroad Administration as office engineer at Chicago and later became engineering assistant at that point and field engineer on the Pacific region at San Francisco. In May, 1922, he became an engineer accountant in the office of the chief engineer of the U. P. at Omaha, and in May, 1925, was appointed assistant engineer, which position he was holding at the time of his recent promotion to special representative of the president.

J. W. Kern, Jr., district engineer of the Southern lines of the Illinois Central, with headquarters at New Orleans, La., has been promoted to superintendent of the Springfield division, with headquarters at Clinton, Ill. Mr. Kern entered the service of the Illinois Central on October 3, 1905, as a chainman at Corinth, Miss., being advanced successively to rodman, instrument and masonry inspector. In June, 1911, he was promoted to resident engineer at Chicago, and in October of the same year he was promoted to assistant engineer on the New Orleans division. He was further promoted to supervisor on the St. Louis division in January, 1913, holding this position until

J. W. Kern, Jr.

June, 1917, when he enlisted in the Thirteenth Engineers, U. S. Army. On his return to civil life in June, 1919, he was promoted to roadmaster of the Mississippi division, with headquarters at Water Valley, Miss., and on May 20, 1920, was transferred to the St. Louis division with headquarters at Carbondale, Ill. On January 1, 1923, Mr. Kern was promoted to district engineer of the Southern lines, with headquarters at New Orleans, which position he was holding at the time of his recent promotion to superintendent of the Springfield division.

Engineering

A. B. Hillman, assistant trainmaster on the Belt Railway of Chicago, with headquarters at Clearing, Ill., has been appointed assistant engineer, with headquarters at Chicago.

F. C. James, chief draftsman on the Norfolk & Western at Roanoke, Va., has been promoted to assistant engineer, with headquarters at the same point, in charge of engineering and construction work on the Shenandoah and Radford divisions and the Roanoke terminal, succeeding **Abraham Bruner,** who has been retired by reason of reaching the age limit.

S. N. Crowe, division engineer of the Western division of the Wabash, with headquarters at Moberly, Mo., has been promoted to assistant chief engineer, with headquarters at St. Louis, Mo., to succeed **W. R. Bennett,** whose promotion to assistant to the president is noted elsewhere in this issue. **O. A. Lewis,** assistant engineer at Moberly, has been promoted to division engineer to succeed Mr. Crowe.

H. C. Munson, office engineer of the Eastern lines of the Chicago, Milwaukee, St. Paul & Pacific, with headquarters at Chicago, has been promoted to division engineer, with headquarters at Sioux City, Iowa, to succeed **H. B. Christianson,** who has been transferred to Marion, Iowa, to succeed **E. L. Sinclair,** notice of whose death will be found elsewhere in these columns. **L. D. Hadwen,** assistant engineer, who has been on leave of absence, has been appointed office engineer at Chicago to succeed Mr. Munson.

Ralph R. Strother, whose promotion to assistant chief engineer of the Chicago, St. Paul, Minneapolis & Omaha was noted in the March issue, was born at Hubbard, Iowa, on August 17, 1885,

Ralph R. Strother

and graduated from Iowa State College in 1909. In September, 1909, he entered railway service in the engineering department of the Chicago & North Western and five years later was appointed assistant engineer on field work for the Omaha. In 1920 he was promoted to assistant engineer in charge of estimates at St. Paul, Minn., which position he was holding at the time of his recent promotion to assistant chief engineer.

Ralph A. Whiteford, whose promotion to division engineer on the Chicago, Milwaukee, St. Paul & Pacific was noted in the February issue, was born on October 3, 1897, at Williamsburg, Iowa, and graduated from the University of Iowa in 1922. Mr. Whiteford entered railway service in June, 1917, as a rodman on the Milwaukee and

Ralph A. Whiteford

was promoted to instrumentman on valuation work in February, 1918, in which capacity he served until October of the same year. He was also instrumentman at Chicago from June, 1919, to the following October. After completing his college course, Mr. Whiteford re-entered the service of the Milwaukee as an instrumentman at Minneapolis, Minn., in June, 1922, and was promoted to assistant engineer at the same point, which position he was holding at the time of his recent promotion to division engineer, with headquarters at Minneapolis.

Henry S. Loeffler, assistant engineer in the bridge department of the Great Northern, has been promoted to bridge engineer, with headquarters at St. Paul, Minn., to succeed **John A. Bohland,** who has been appointed office engineer of the bridge department, with headquarters at St. Paul, as heretofore. **George V. Guerin,** draftsman and inspector in the bridge department, has been promoted to assistant bridge engineer of the lines east of Minot, N. D., with headquarters at St. Paul, and **Harry A. Gerst,** assistant bridge engineer of the system at St. Paul, has been appointed assistant bridge engineer of lines west of Minot with headquarters at Spokane, Wash.

Frank R. Rex, supervisor on the Eastern division of the Pennsylvania, with headquarters at Alliance, Ohio, has been promoted to division engineer of the Sunbury division, with headquarters at Sunbury, Pa., succeeding **W. S. Thompson,** who has been appointed assistant to the engineer maintenance of way of the Central Pennsylvania general division. **R. F. Hanson,** inspector maintenance of way on the Southern division with headquarters at Wilmington, Del., has been promoted to assistant engineer of construction. **C. O. Long,** supervisor on the New York zone at Trenton, N. J., has been promoted to assistant division engineer of the Fort Wayne division, with headquarters at Fort Wayne, Ind. Mr. Rex, who graduated from the Carnegie Institute of Technology in 1912, entered railway service in 1908 as an assistant on engineer corps on the Eastern division of the Central region of the Pennsylvania. In 1915 he became an assistant on engineer corps in the valuation department and later served as a building pilot engineer in the same department. In May, 1923, he was promoted to assistant supervisor on the Pittsburgh division at Gallitzen, Pa., and in 1924 was further promoted to supervisor on the Allegheny division at Dunkirk, N. Y. In April, 1926, he was transferred to Alliance, Ohio, where he was located at the time of his recent promotion to division engineer.

Mr. Thompson entered railway service on August 18, 1899, as an assistant engineer on the Pennsylvania at Oil City, Pa. In April, 1909, he was promoted to division engineer of the Sunbury division, which position he was holding at the time of his recent promotion to assistant to the engineer maintenance of way of the Central Pennsylvania division.

R. A. Van Ness, whose promotion to bridge engineer of the Atchison, Topeka & Santa Fe System was noted in the March issue, was born on October 13, 1892, at McLean, Ill., and was educated at Ohio Northern University, where he graduated in 1914. During 1914 and 1915 he took a post-graduate course at the University of Washington, entering the service of the United

R. A. Van Ness

States Bureau of Valuation in May, 1915. From April, 1916, to February, 1917, he was in the employ of the American Bridge Company at its Gary (Ind.) plant and then entered railway service in the bridge department of the Santa Fe at Chicago. Mr. Van Ness enlisted in the Engineering Corps of the United States Army in May, 1917,

and returned to the Santa Fe in July, 1919, as an assistant engineer on the detailing and design of buildings and bridges. In March, 1925, he was promoted to resident engineer on the Mississippi River bridge at Ft. Madison, Iowa, and in 1925 he was transferred to Amarillo, Tex., where he was located at the time of his recent promotion to bridge engineer of the system.

G. M. O'Rourke, roadmaster of the St. Louis division of the Illinois Central, with headquarters at Carbondale, Ill., has been promoted to district engineer of the Western lines with headquarters at Waterloo, Iowa, to succeed **J. E. Fanning**, who has been transferred to the Southern lines, with headquarters at New Orleans, La., to replace **J. W. Kern, Jr.**, whose promotion to superintendent of the Springfield division will be found elsewhere in these columns. **H. C. Hayes**, assistant engineer at Chicago, has been promoted to road-

G. M. O'Rourke

master of the Springfield division, with headquarters at Clinton, Ill., succeeding **W. R. Gillam, who has** been transferred to the St. Louis division to succeed Mr. O'Rourke.

Mr. O'Rourke was born on February 22, 1889, at Chicago and was educated at Armour Institute of Technology. He entered the service of the Illinois Central as an engineering apprentice on the St. Louis division and later served as draftsman, rodman and masonry inspector at various points until January 11, 1914, when he was promoted to resident engineer at Dyersburg, Tenn. On October 28 of the same year he was promoted to chief draftsman in the valuation department and on August 5, 1915, to assistant engineer of the St. Louis division at Carbondale. He was further promoted to supervisor of the Carbondale district on June 1, 1917, and this was followed on February 1, 1919, by his promotion to roadmaster of the Indiana division, with headquarters at Mattoon, Ill. Mr. O'Rourke was transferred to the St. Louis division on January 1, 1923, where he was located at the time of his recent promotion to district engineer of the Western lines.

John F. Collins has been appointed division engineer of the Portland division of the Boston & Maine, with headquarters at Dover, N. H., succeeding **Robert H. Parke**, who has been appointed resident engineer, with headquarters at Springfield, Mass. **Henry L. Restall** has been promoted to assistant valuation engineer, with headquarters at Boston, Mass., in charge of compliance with Valuation Order No. 3. **Henry C. Archibald**, on special work in the construction department, has been appointed assistant division engineer, with headquarters at Fitchburg, Mass., succeeding **John F. Whitney**, resigned. **John P. Cronin**, assistant engineer, has been promoted to office engineer with headquarters at Boston, to succeed **P. L. Dowd**, who has been assigned to other duties. **Edward W. Backes**, on special work in the engineering department, has been promoted to resident engineer with headquarters at Concord, N. H.

Mr. Cronin was born on June 22, 1888, at Worcester, Mass., and graduated from the University of Maine in 1912. In June of the same year he entered railway service on the Boston & Maine, where he served in the capacity of draftsman and assistant engineer until the time of his recent promotion to office engineer.

Mr. Archibald was born on June 26, 1891, at Everett, Mass., and graduated in 1915 from Tufts College. In June of the same year he entered the service of the Boston & Maine as a structural designer and draftsman. In 1925 he was promoted to supervisor of bridges and buildings at Nashua, N. H., and in 1927 was transferred to Salem, Mass., later serving on special assignments on the White Mountain and Terminal divisions. During the last year he has served in the construction department. During the World War, Mr. Archibald served overseas in the heavy artillery for 27 months.

Track

Joe Iocona, section foreman on the Belt Railway of Chicago, has been promoted to assistant roadmaster, with headquarters at Clearing, Ill., a newly created position.

Algie E. Cluff, assistant supervisor on the Boston & Maine at Nashua, N. H., has been promoted to supervisor with headquarters at Dover, N. H., succeeding **C. W. Lewis**, who has been assigned to other duties.

R. M. Murphy, roadmaster on the Kansas City Southern, with headquarters at Port Arthur, Tex., has been transferred to Leesville, La., to succeed **R. T. Huson**, whose promotion to tie and timber agent, with headquarters at Kansas City, Mo., is noted elsewhere in this issue.

Ole Hagen, roadmaster on the Minneapolis, St. Paul & Sault Ste. Marie, with headquarters at Hankinson, N. D., has retired after 42 years' service with that company. Mr. Hagen was born in Oslo, Norway, on July 5, 1863, and came to this country when a boy. He entered the service of the Soo Line in 1887 as a section laborer and two years later was promoted to section foreman. He was promoted to roadmaster in 1904, which position he was holding at the time of his recent retirement.

Louis F. Racine, whose promotion to roadmaster on the Oregon Short Line, with headquarters at Ashton, Idaho, was noted in the February number, was born on August 29, 1890, at Des Moines, Iowa, and was educated at the University of Nevada. He entered railway service in May, 1915, and in April, 1916, became an instrumentman on construction on the Oregon Short Line. In November of the same year, he was promoted to assistant engineer on maintenance of way and in October, 1919, he was made office engineer. He returned to the duties of assistant engineer in July, 1920, which position he was holding at the time of his promotion to roadmaster in January of the present year.

George H. Hammock, whose appointment as roadmaster on the Oregon Short Line, with headquarters at Idaho Falls, Idaho, was noted in the February issue, was born on July 23, 1892, at Robbins, Tenn. He entered railway service on May 31, 1907, as a section laborer on the Oregon Short Line and was promoted to section foreman in March, 1908, continuing in this position until May, 1912, when he became a conductor for the Portland Railway, Power & Light Company. Mr. Hammock returned to the O. S. L. in May, 1914, as a section foreman. In 1918, he was granted leave to enter military service, resuming his position as section foreman in January, 1919. He was promoted to assistant roadmaster in March, 1926, which position he was holding at the time of his promotion to roadmaster.

Garret J. Nash, whose name was shown incorrectly in the February issue as George J. Nash in the notice of his promotion to supervisor on the Illinois Central, was born on May 28, 1893, at Two Rivers, Wis., and was educated at the University of Wisconsin. He entered railway service on October 17, 1917, as a chainman on construction on the Illinois Central and later served as rodman and instrument on construction. He became an instrumentman on maintenance in March, 1920, and in November, 1925, was promoted to assistant engineer on the East St. Louis terminals. Mr. Nash was transferred to the office of the assistant engineer maintenance of way at Chicago in September, 1926, where he was located at the time of his recent promotion to supervisor.

A. J. Greenough, assistant on engineer corps on the Pennsylvania at Lancaster, Pa., has been promoted to assistant supervisor at York, Pa., succeeding **L. A. Evans**, who has been transferred to Downington, Pa., to succeed **J. D. Morris**, transferred to Tyrone, Pa. Mr. Morris replaces **B. W. Tyler, Jr.**, who has been promoted to supervisor with headquarters at Wilkes-Barre, Pa., to succeed **R. W. Sheffer,**

who in turn has been transferred to Atlantic City, N. J., to take the place of **R. G. Davis**, transferred to Alliance, Ohio, to succeed **Frank R. Rex**, whose promotion to division engineer, with headquarters at Sunbury, Pa., is noted elsewhere in this issue.

Mr. Tyler was born on April 14, 1903, at Shelbyville, Ill., and was educated at Rose Polytechnic Institute, where he graduated in 1923. He entered railway service on January 21, 1925, as an assistant on engineer corps on the Pennsylvania at Terre Haute, Ind. On December 22, 1926, he was promoted to assistant supervisor on the Trenton division at Bordentown, N. J., and was transferred successively to the Maryland division at Chester, Pa., and to the Middle division at Tyrone, where he was located at the time of his recent promotion.

R. Double, roadmaster on the Chicago, Burlington & Quincy, with jurisdiction over the branches between Creston, Iowa, and Cumberland, and between Creston and Amazonia, Mo., has been appointed roadmaster of the main line of the Creston division between Creston and Pacific Junction, succeeding **P. J. Melody**, who has been transferred to Red Oak, Iowa, to succeed **A. C. Anderson**, who has been transferred to Creston to assume charge of Mr. Double's former territory. **C. Eggert**, roadmaster on the LaCrosse division, with headquarters at LaCrosse, has been transferred at his own request, to the Galesburg division, with headquarters at Galesburg, Ill., where he succeeds **G. L. Griggs, Jr.**, who has been placed in charge of the Galesburg to Peoria and Buda to Rushville branches, with headquarters as heretofore at Galesburg, to take the place of **C. H. Freed**, who, in turn, has been transferred to the LaCrosse division to succeed Mr. Eggert.

Bridge and Building

James Dobbie has been appointed bridge and building master on the Kettle Valley, with headquarters at Penticton, B. C.

E. E. Booth, superintendent and master mechanic of the Beaver, Meade & Englewood, with headquarters at Forgan, Okla., has been appointed superintendent of bridges, buildings and construction.

Water Service

A. B. Zumwalt has been appointed supervisor of pipe lines on the New Mexico division of the Southern Pacific, a newly created position, with headquarters at Carizozo, N. M. **Wesley M. Rose**, supervisor of water service, with headquarters at Sacramento, Cal., has retired after 32 years' service.

Purchasing and Stores

J. L. Nichols has been appointed stationery storekeeper of the Cleveland, Cincinnati, Chicago & St. Louis, with headquarters at Beech Grove, Ind., succeeding **W. A. Saffell**, who has been assigned to other duties.

R. T. Huson, roadmaster on the Kansas City Southern, with headquarters at Leesville, La., has been promoted to tie and timber agent, with headquarters at Kansas City, Mo.

Obituary

Dwight A. Riley, assistant engineer on the Baltimore & Ohio, with headquarters at Baltimore, Md., died suddenly in that city on February 2.

E. L. Sinclair, division engineer of the Iowa division of the Chicago, Milwaukee, St. Paul & Pacific, with headquarters at Marion, Iowa, died suddenly on February 28 as the result of cerebral hemorrhage.

Samuel Rea, president of the Pennsylvania at the time of his retirement on October 1, 1925, and an engineer by training and experience, died on March 24 at his home near Ardmore, Pa., a suburb of Philadelphia. Mr. Rea was born on September 21, 1855, at Hollidaysburg, Pa., and entered railway service on July 17, 1871, in the engineering department of the Pennsylvania, where he was engaged for two years in work on the Morrison's Cove, Williamsburg and Bloomfield branches. In 1874 and 1875, he was in the service of the Holiday Iron & Nail Company, then re-entering the engineering department of the Pennsylvania where for two years he was an assistant engineer in charge of the construction of the chain suspension bridge over the Monongahela river at Pittsburgh, Pa. He became an assistant engineer on the Pittsburgh & Lake Erie in 1877 and in 1879 was in charge of the construction of an extension of the Pittsburgh, West Virginia & Charleston (now a part of the Pennsylvania). In the latter part of the same year he was engineer in charge of surveys in Westmoreland County, Pa., and the revision and rebuilding of the Western Pennsylvania (now also a part of the Pennsylvania). In 1883 he was appointed principal assistant engineer of the Pennsylvania and in 1888 was further promoted to assistant to the second vice-president. Later in the latter year he became vice-president of the Maryland Central (now a part of the Maryland & Pennsylvania) and chief engineer of the Baltimore Belt (now a part of the Baltimore & Ohio). Mr. Rea was out of railway service from April, 1891, to May 25, 1892, when he returned to the Pennsylvania as assistant to the president. He was promoted to first assistant to the president on February 10, 1897, and on June 14, 1899, was elected fourth vice-president of the lines east of Pittsburgh, Pa., and Erie. By successive promotions he became first vice-president on March 24, 1909, and on May 8, 1912, he was made vice-president in direct charge of the New York tunnel and terminal improvements. Mr. Rea was elected president of the Pennsylvania Railroad on January 1, 1913, serving in that capacity on that road and its successor, the Pennsylvania System, until the time of his retirement from active duties on October 1, 1925.

Samuel Rea

Hugh Curry, who had been roadmaster of the Alabama & Vicksburg (now a part of the Illinois Central) for 42 years at the time of his retirement on June 2, 1926, died in a hospital at Meridian, Miss., on January 10, at the age of 74 years, following an attack of influenza.

L. W. Swan, supervisor of bridges and buildings on the Lehigh Valley, with headquarters at Easton, Pa., died on February 28 at Easton. **E. R. Wenner**, supervisor of bridges and buildings, with headquarters at Wilkes-Barre, Pa., died suddenly in the passenger station in that city on March 4, while on his way to attend the funeral of Mr. Swan.

William Bittler, superintendent of water stations on the Pennsylvania between Crestline, Ohio, and Chicago, at the time of his retirement nine years ago, died at Ft. Wayne, Ind., on February 26, at the age of 78 years. Mr. Bittler entered the service of the Pennsylvania in 1868 as a stonemason and in 1875 was placed in charge of the maintenance of water stations between Crestline and Chicago, which position he was holding at the time of his retirement.

C. H. Kluegel, chief engineer of the Oahu Railway & Land Company, with headquarters at Honolulu, Hawaii, died at the Queen's hospital in that city on January 10, after an extended illness. Mr. Kluegel was born on February 27, 1847, at Newburgh, Ohio, and was educated at Union College (Schenectady, N. Y.), where he graduated in 1867. After leaving college, he spent 20 years on the Pacific Coast on various engineering projects, which included the position of locating engineer on the Pacific line of the Mexican Central (now a part of the National Railways of Mexico) and similar work on the Northern Pacific, as well as the location, construction and maintenance of several smaller roads. He was appointed chief engineer of the Oahu Railway & Land Company, in October, 1888, and later was also chief engineer of the Hilo Railway.

Supply Trade News

General

The Bates Valve Bag Corporation, Chicago, has been acquired by the St. Regis Paper Company, and the business will be carried on as a wholly-owned subsidiary of the latter company, with no change in corporate title.

The Bucyrus-Erie Company, South Milwaukee, Wis., has moved its Chicago district office to 105 West Adams street, Chicago. **A. R. Hance** will be in charge of machines of more than 1¼ cu. yd. capacity, while **W. K. Fawcett** will handle the smaller machines.

A. W. French & Co., Chicago, has been merged with the Blaw-Knox Company, Pittsburgh, Pa. The personnel and policies of the former company will continue as heretofore and its plant and sales organization will function as a separate division of the Blaw-Knox Company.

The Philip Carey Manufacturing Company, Lockland, Ohio, and the Servicized Products Corporation, Chicago, have terminated their differences, including pending litigation, and the Servicized Products Corporation was granted, as of December 12, 1928, and is now manufacturing premoulded products under a license on patents owned by the Philip Carey Manufacturing Company, including, in addition to patents formerly owned by that company, all patents heretofore owned by the Servicized Laboratories, Inc., relating to premoulded products, such as expansion joint, rail filler, track pavement, railroad crossings, construction materials and other like products. Other than as above stated, the two companies are entirely distinct and independent corporations.

Personal

H. H. Wood, formerly chief engineer of the Laclede Steel Company, St. Louis, Mo., has become connected with the industrial department of the Timken Roller Bearing Company, Canton, Ohio, with headquarters for the present at Canton.

E. C. Afflerbach has been appointed district sales representative in Texas for the Woodings Forge & Tool Company, Verona, Pa., with headquarters in the Second National Bank Building, Houston, Tex., and **Denyven & Linn,** 250 Stuart street, Boston, Mass., have been appointed district sales representative in the New England States.

C. L. Pierce, Jr., vice-president of Hubbard & Co., Pittsburgh, Pa., has been elected president to succeed **John W. Hubbard,** who has been elected chairman of the board. **Joseph V. Smith,** manager of the Pittsburgh factory, has been elected vice-president in charge of the electrical division, and **W. R. Pounder,** manager, has also been elected a vice-president. **C. H. Keen,** New England sales representative, has been promoted to sales manager of the New York district to succeed **W. W. Glosser,** who has been promoted to Pacific Coast manager. **R. M. Waggoner,** sales engineer, and **R. G. Robbins,** advertising manager, both with headquarters at Pittsburgh, have been promoted to assistant sales managers.

Myron C. Atwood, president and general manager of the Western Wheeled Scraper Company, Aurora, Ill., died in that city on February 26, after a lingering illness. Mr. Atwood was born

Myron C. Atwood

on August 24, 1863, in Kane county, Ill., and entered railway service in 1880 as a ticket agent and operator on the Chicago, Burlington & Quincy, later serving as agent at Earlville, Ill., and Ottawa. In January, 1892, he was promoted to commercial agent at Aurora, and on October, 1903, he was appointed superintendent of the Fulton County Narrow Gage (a subsidiary of the Burlington.) In 1905 he was elected also vice-president of that road, retaining these positions until 1906, when he resigned to become assistant manager of the Western Wheeled Scraper Company. He was promoted to general manager in 1910 and in 1925 was elected president and general manager, which position he was holding at the time of his death.

William R. Seigle, vice-president in charge of mines and factories of the Johns-Manville Corporation, New York, has been elected chairman of the board of directors to succeed **H. E. Manville,** who has resigned, and **Lewis H. Brown,** secretary and assistant to the president, has been elected president to succeed **Theodore F. Merseles,** notice of whose death will be found elsewhere in these columns.

Mr. Seigle was born in 1879 at Easton, Pa., and has been in the service of the Johns-Manville Corporation and its predecessor company since his graduation from college in 1900, where his technical training covered the fields of mechanical and electrical engineering as well as electro-chemistry, which enabled him to develop many of the materials on which the company has based its success.

Mr. Brown was born in 1894 at Creston, Iowa, and was educated at the University of Iowa. After graduation he became a salesman and assistant to the sales manager of a manufacturing company in Indiana. During the World War he served for two years as a captain of infantry in the 84th division and as a staff officer at the A. E. F. headquarters in France. Immediately after the war he became connected with Montgomery Ward & Co., where he served as office manager, superintendent of merchandise and assistant general operating manager. In 1927 he was appointed assistant to the president of the Johns-Manville Corporation, which position he was holding at the time of his recent election to the presidency of that concern.

Theodore F. Merseles, president of the Johns-Manville Corporation, New York, died suddenly on March 6 at Del Monte, Cal. Mr. Merseles was born on August 17, 1863, at Jersey City, N. J., and entered railway service as a clerk with the Pennsylvania in that city, later becoming a clerk for the Trunk Line Association in New York. He then became manager and vice-president of the Western Wheel Works at Chicago, and in 1899 participated in the organization of the American Bicycle Company of New York, of which he was made vice-president. In 1903 he became general manager of the National Cloak & Suit Company, a mail order concern, at New York, leaving that

Theodore F. Merseles

position in 1921 to become president of Montgomery Ward & Company. Mr. Merseles was elected president of the Johns-Manville Corporation in 1927 and was holding that position at the time of his death.

P. B. Bird, president of the Bird-Archer Company, Chicago, has been elected chairman of the board of directors, with headquarters at 1 East Forty-second street, New York, and will continue actively in charge of policy and finance. **L. F. Wilson,** vice-president and general manager, has been elected president and general manager, in charge of the general operation of the company,

with headquarters at Chicago. **W. E. Ridenour** has been elected executive vice-president with office at Philadelphia, Pa., his duties to include those of chief chemist as heretofore. **C. A. Bird** has been elected secretary with office at New York. **H. C. Harragin** has been appointed district manager with office at New York, in charge of operations in the eastern section of the United States, reporting to the general manager. **T. A. Peacock** has been appointed district manager with office at Winnipeg, Man., in charge of operations throughout Canada, reporting to the general manager. **S. P. Foster** has been appointed assistant to the president with office at Chicago and combines the duties of chemical engineer with the duties of assistant to the president.

H. J. Clarity has been appointed representative of the Lehon Company, Chicago, with headquarters at 419 South Fourth street, Minneapolis, Minn. and **Henry W. Dickerson** has been appointed representative at Richmond, Va., with headquarters at 923 Mutual building.

Trade Publications

Fissures in Steel Rails.—The Robert W. Hunt Company, engineers, Chicago, Ill., has issued a card, 14 in. by 11 in., illustrating and describing internal fissures in rails, including those of the transverse, horizontal and compound types.

Boyer Riveting Hammers.—An eight-page bulletin, No. SP-1694, has been issued by the Chicago Pneumatic Tool Company, New York, describing the Boyer riveting hammers produced by that concern, with special reference to the improved valve unit which is now furnished as regular equipment with these tools.

Rotary Pumps.—The Geo. D. Roper Corporation, Rockford, Ill., has issued an 80-page, loose-leaf catalog describing the Trahern rotary pumps manufactured by that company for railway use as well as for other purposes. Each type of pump is shown in illustrations together with curves showing capacity and horsepower performance, while views are given of numerous installations.

Fairmont Line Book.—Fairmont Railway Motors, Inc., has issued a 22-page booklet listing and describing the Fairmont and Mudge motor cars and other self-propelled labor-saving devices manufactured by that company.

Shallow-Pit Coaling Plants.—The Roberts & Schaefer Company, Chicago, has issued Bulletin No. 115, an eight-page booklet illustrating and describing its shallow-pit coaling plants, in which an elevating bucket receives coal automatically from a track hopper, this feature, together with a Cutter-Hammer controller, insuring automatic operation of the plant after it has been started.

Personal Mention

General

W. R. Bennett, assistant chief engineer of the Wabash, with headquarters at St Louis, Mo., has been promoted to assistant to the president, with headquarters in the same city.

T. J. Quigley, superintendent of the Illinois division of the Illinois Central, with headquarters at Champaign, Ill., and an engineer by training and experience, has been promoted to general superintendent of the Southern lines, with headquarters at New Orleans, La. Mr. Quigley was born on February 4, 1883, at Paducah, Ky., and was educated at the Virginia Military Institute, where he graduated in 1904. He entered railway service on January 1, 1905, as a track apprentice on the Illinois Central, and was promoted successively to chainman, rodman, resident engineer, assistant engineer, supervisor and assistant roadmaster until 1914, when he was promoted to roadmaster at McComb, Miss. Mr. Quigley entered the operating department in 1917 as trainmaster at McComb and in 1919 was promoted to superintendent of the Louisiana division, with headquarters at the same point. In 1926 he was transferred to the Illinois division, with headquarters at Champaign, where he was serving as superintendent at the time of his recent promotion to general superintendent of the Southern lines.

T. J. Quigley

Chester K. Smith, assistant engineer on the Union Pacific, has been promoted to special representative of the president, with headquarters at Omaha, Neb. Mr. Smith was born on March 26, 1885, at Bloomington, Ill., where he completed the engineering course in 1907. He entered railway service in the same year as a draftsman on the Panama Railroad and later was promoted to chief draftsman. He was engaged in smelter construction in South America and on irrigation work in Oregon from 1908 to 1911, returning to railroad service in the latter year as assistant bridge engineer of the Spokane, Portland & Seattle, later being promoted to bridge engineer. Mr. Smith entered military service in 1917 as lieutenant of engineers and was advanced successively to captain and major, serving overseas on railroad and dock construction from August, 1917, to January, 1919. In March, 1919, he entered the service of the U. S. Railroad Administration as office engineer at Chicago and later became engineering assistant at that point and field engineer on the Pacific region at San Francisco. In May, 1922, he became an engineer accountant in the office of the chief engineer of the U. P. at Omaha, and in May, 1925, was appointed assistant engineer, which position he was holding at the time of his recent promotion to special representative of the president.

J. W. Kern, Jr., district engineer of the Southern lines of the Illinois Central, with headquarters at New Orleans, La., has been promoted to superintendent of the Springfield division, with headquarters at Clinton, Ill. Mr. Kern entered the service of the Illinois Central on October 3, 1905, as a chainman at Corinth, Miss., being advanced successively to rodman, instrument and masonry inspector. In June, 1911, he was promoted to resident engineer at Chicago, and in October of the same year he was promoted to assistant engineer on the New Orleans division. He was further promoted to supervisor on the St. Louis division in January, 1913, holding this position until June, 1917, when he enlisted in the Thirteenth Engineers, U. S. Army. On his return to civil life in June, 1919, he was promoted to roadmaster of the Mississippi division, with headquarters at Water Valley, Miss., and on May 20, 1920, was transferred to the St. Louis division with headquarters at Carbondale, Ill. On January 1, 1923, Mr. Kern was promoted to district engineer of the Southern lines, with headquarters at New Orleans, which position he was holding at the time of his recent promotion to superintendent of the Springfield division.

J. W. Kern, Jr.

Engineering

A. B. Hillman, assistant trainmaster on the Belt Railway of Chicago, with headquarters at Clearing, Ill., has been appointed assistant engineer, with headquarters at Chicago.

F. C. James, chief draftsman on the Norfolk & Western at Roanoke, Va., has been promoted to assistant engineer, with headquarters at the same point, in charge of engineering and construction work on the Shenandoah and Radford divisions and the Roanoke terminal, succeeding **Abraham Bruner,** who has been retired by reason of reaching the age limit.

S. N. Crowe, division engineer of the Western division of the Wabash, with headquarters at Moberly, Mo., has been promoted to assistant chief engineer, with headquarters at St. Louis, Mo., to succeed **W. R. Bennett,** whose promotion to assistant to the president is noted elsewhere in this issue. **O. A. Lewis,** assistant engineer at Moberly, has been promoted to division engineer to succeed Mr. Crowe.

H. C. Munson, office engineer of the Eastern lines of the Chicago, Milwaukee, St. Paul & Pacific, with headquarters at Chicago, has been promoted to division engineer, with headquarters at Sioux City, Iowa, to succeed **H. B. Christianson,** who has been transferred to Marion, Iowa, to succeed **E. L. Sinclair,** notice of whose death will be found elsewhere in these columns. **L. D. Hadwen,** assistant engineer, who has been on leave of absence, has been appointed office engineer at Chicago to succeed Mr. Munson.

Ralph R. Strother, whose promotion to assistant chief engineer of the Chicago, St. Paul, Minneapolis & Omaha was noted in the March issue, was born at Hubbard, Iowa, on August 17, 1885,

Ralph R. Strother

and graduated from Iowa State College in 1909. In September, 1909, he entered railway service in the engineering department of the Chicago & North Western and five years later was appointed assistant engineer on field work for the Omaha. In 1920 he was promoted to assistant engineer in charge of estimates at St. Paul, Minn., which position he was holding at the time of his recent promotion to assistant chief engineer.

Ralph A. Whiteford, whose promotion to division engineer on the Chicago, Milwaukee, St. Paul & Pacific was noted in the February issue, was born on October 3, 1897, at Williamsburg, Iowa, and graduated from the University of Iowa in 1922. Mr. Whiteford entered railway service in June, 1917, as a rodman on the Milwaukee and

Ralph A. Whiteford

was promoted to instrumentman on valuation work in February, 1918, in which capacity he served until October of the same year. He was also instrumentman at Chicago from June, 1919, to the following October. After completing his college course, Mr. Whiteford re-entered the service of the Milwaukee as an instrumentman at Minneapolis, Minn., in June, 1922, and was promoted to assistant engineer at the same point, which position he was holding at the time of his recent promotion to division engineer, with headquarters at Minneapolis.

Henry S. Loeffler, assistant engineer in the bridge department of the Great Northern, has been promoted to bridge engineer, with headquarters at St. Paul, Minn., to succeed **John A. Bohland,** who has been appointed office engineer of the bridge department, with headquarters at St. Paul, as heretofore. **George V. Guerin,** draftsman and inspector in the bridge department, has been promoted to assistant bridge engineer of the lines east of Minot, N. D., with headquarters at St. Paul, and **Harry A. Gerst,** assistant bridge engineer of the system at St. Paul, has been appointed assistant bridge engineer of lines west of Minot with headquarters at Spokane, Wash.

Frank R. Rex, supervisor on the Eastern division of the Pennsylvania, with headquarters at Alliance, Ohio, has been promoted to division engineer of the Sunbury division, with headquarters at Sunbury, Pa., succeeding **W. S. Thompson,** who has been appointed assistant to the engineer maintenance of way of the Central Pennsylvania general division. **R. F. Hanson,** inspector maintenance of way on the Southern division with headquarters at Wilmington, Del., has been promoted to assistant engineer of construction. **C. O. Long,** supervisor on the New York zone at Trenton, N. J., has been promoted to assistant division engineer of the Fort Wayne division, with headquarters at Fort Wayne, Ind. Mr. Rex, who graduated from the Carnegie Institute of Technology in 1912, entered railway service in 1908 as an assistant on engineer corps on the Eastern division of the Central region of the Pennsylvania. In 1915 he became an assistant on engineer corps in the valuation department and later served as a building pilot engineer in the same department. In May, 1923, he was promoted to assistant supervisor on the Pittsburgh division at Gallitzen, Pa., and in 1924 was further promoted to supervisor on the Allegheny division at Dunkirk, N. Y. In April, 1926, he was transferred to Alliance, Ohio, where he was located at the time of his recent promotion to division engineer.

Mr. Thompson entered railway service on August 18, 1899, as an assistant engineer on the Pennsylvania at Oil City, Pa. In April, 1909, he was promoted to division engineer of the Sunbury division, which position he was holding at the time of his recent promotion to assistant to the engineer maintenance of way of the Central Pennsylvania division.

R. A. Van Ness, whose promotion to bridge engineer of the Atchison, Topeka & Santa Fe System was noted in the March issue, was born on October 13, 1892, at McLean, Ill., and was educated at Ohio Northern University, where he graduated in 1914. During 1914 and 1915 he took a post-graduate course at the University of Washington, entering the service of the United

R. A. Van Ness

States Bureau of Valuation in May, 1915. From April, 1916, to February, 1917, he was in the employ of the American Bridge Company at its Gary (Ind.) plant and then entered railway service in the bridge department of the Santa Fe at Chicago. Mr. Van Ness enlisted in the Engineering Corps of the United States Army in May, 1917,

and returned to the Santa Fe in July, 1919, as an assistant engineer on the detailing and design of buildings and bridges. In March, 1925, he was promoted to resident engineer on the Mississippi River bridge at Ft. Madison, Iowa, and in 1925 he was transferred to Amarillo, Tex., where he was located at the time of his recent promotion to bridge engineer of the system.

G. M. O'Rourke, roadmaster of the St. Louis division of the Illinois Central, with headquarters at Carbondale, Ill., has been promoted to district engineer of the Western lines with headquarters at Waterloo, Iowa, to succeed **J. E. Fanning,** who has been transferred to the Southern lines, with headquarters at New Orleans, La., to replace **J. W. Kern, Jr.,** whose promotion to superintendent of the Springfield division will be found elsewhere in these columns. **H. C. Hayes,** assistant engineer at Chicago, has been promoted to road-

G. M. O'Rourke

master of the Springfield division, with headquarters at Clinton, Ill., succeeding **W. R. Gillam,** who has been transferred to the St. Louis division to succeed Mr. O'Rourke.

Mr. O'Rourke was born on February 22, 1889, at Chicago and was educated at Armour Institute of Technology. He entered the service of the Illinois Central as an engineering apprentice on the St. Louis division and later served as draftsman, rodman and masonry inspector at various points until January 11, 1914, when he was promoted to resident engineer at Dyersburg, Tenn. On October 28 of the same year he was promoted to chief draftsman in the valuation department and on August 5, 1915, to assistant engineer of the St. Louis division at Carbondale. He was further promoted to supervisor of the Carbondale district on June 1, 1917, and this was followed on February 1, 1919, by his promotion to roadmaster of the Indiana division, with headquarters at Mattoon, Ill. Mr. O'Rourke was transferred to the St. Louis division on January 1, 1923, where he was located at the time of his recent promotion to district engineer of the Western lines.

John F. Collins has been appointed division engineer of the Portland division of the Boston & Maine, with headquarters at Dover, N. H., succeeding **Robert H. Parke,** who has been appointed resident engineer, with headquarters at Springfield, Mass. **Henry L. Restall** has been promoted to assistant valuation engineer, with headquarters at Boston, Mass., in charge of compliance with Valuation Order No. 3. **Henry C. Archibald,** on special work in the construction department, has been appointed assistant division engineer, with headquarters at Fitchburg, Mass., succeeding **John F. Whitney,** resigned. **John P. Cronin,** assistant engineer, has been promoted to office engineer with headquarters at Boston, to succeed **P. L. Dowd,** who has been assigned to other duties. **Edward W. Backes,** on special work in the engineering department, has been promoted to resident engineer with headquarters at Concord, N. H.

Mr. Cronin was born on June 22, 1888, at Worcester, Mass., and graduated from the University of Maine in 1912. In June of the same year he entered railway service on the Boston & Maine, where he served in the capacity of draftsman and assistant engineer until the time of his recent promotion to office engineer.

Mr. Archibald was born on June 26, 1891, at Everett, Mass., and graduated in 1915 from Tufts College. In June of the same year he entered the service of the Boston & Maine as a structural designer and draftsman. In 1925 he was promoted to supervisor of bridges and buildings at Nashua, N. H., and in 1927 was transferred to Salem, Mass., later serving on special assignments on the White Mountain and Terminal divisions. During the last year he has served in the construction department. During the World War, Mr. Archibald served overseas in the heavy artillery for 27 months.

Track

Joe Iocona, section foreman on the Belt Railway of Chicago, has been promoted to assistant roadmaster, with headquarters at Clearing, Ill., a newly created position.

Algie E. Cluff, assistant supervisor on the Boston & Maine at Nashua, N. H., has been promoted to supervisor with headquarters at Dover, N. H., succeeding **C. W. Lewis,** who has been assigned to other duties.

R. M. Murphy, roadmaster on the Kansas City Southern, with headquarters at Port Arthur, Tex., has been transferred to Leesville, La., to succeed **R. T. Huson,** whose promotion to tie and timber agent, with headquarters at Kansas City, Mo., is noted elsewhere in this issue.

Ole Hagen, roadmaster on the Minneapolis, St. Paul & Sault Ste. Marie, with headquarters at Hankinson, N. D., has retired after 42 years' service with that company. Mr. Hagen was born in Oslo, Norway, on July 5, 1863, and came to this country when a boy. He entered the service of the Soo Line in 1887 as a section laborer and two years later was promoted to section foreman. He was promoted to roadmaster in 1904, which position he was holding at the time of his recent retirement.

Louis F. Racine, whose promotion to roadmaster on the Oregon Short Line, with headquarters at Ashton, Idaho, was noted in the February number, was born on August 29, 1890, at Des Moines, Iowa, and was educated at the University of Nevada. He entered railway service in May, 1915, and in April, 1916, became an instrumentman on construction on the Oregon Short Line. In November of the same year, he was promoted to assistant engineer on maintenance of way and in October, 1919, he was made office engineer. He returned to the duties of assistant engineer in July, 1920, which position he was holding at the time of his promotion to roadmaster in January of the present year.

George H. Hammock, whose appointment as roadmaster on the Oregon Short Line, with headquarters at Idaho Falls, Idaho, was noted in the February issue, was born on July 23, 1892, at Robbins, Tenn. He entered railway service on May 31, 1907, as a section laborer on the Oregon Short Line and was promoted to section foreman in March, 1908, continuing in this position until May, 1912, when he became a conductor for the Portland Railway, Power & Light Company. Mr. Hammock returned to the O. S. L. in May, 1914, as a section foreman. In 1918, he was granted leave to enter military service, resuming his position as section foreman in January, 1919. He was promoted to assistant roadmaster in March, 1926, which position he was holding at the time of his promotion to roadmaster.

Garret J. Nash, whose name was shown incorrectly in the February issue as George J. Nash in the notice of his promotion to supervisor on the Illinois Central, was born on May 28, 1893, at Two Rivers, Wis., and was educated at the University of Wisconsin. He entered railway service on October 17, 1917, as a chainman on construction on the Illinois Central and later served as rodman and instrument on construction. He became an instrumentman on maintenance in March, 1920, and in November, 1925, was promoted to assistant engineer on the East St. Louis terminals. Mr. Nash was transferred to the office of the assistant engineer maintenance of way at Chicago in September, 1926, where he was located at the time of his recent promotion to supervisor.

A. J. Greenough, assistant on engineer corps on the Pennsylvania at Lancaster, Pa., has been promoted to assistant supervisor at York, Pa., succeeding **L. A. Evans,** who has been transferred to Downington, Pa., to succeed **J. D. Morris,** transferred to Tyrone, Pa. Mr. Morris replaces **B. W. Tyler, Jr.,** who has been promoted to supervisor with headquarters at Wilkes-Barre, Pa., to succeed **R. W. Sheffer,**

who in turn has been transferred to Atlantic City, N. J., to take the place of **R. G. Davis**, transferred to Alliance, Ohio, to succeed **Frank R. Rex**, whose promotion to division engineer, with headquarters at Sunbury, Pa., is noted elsewhere in this issue.

Mr. Tyler was born on April 14, 1903, at Shelbyville, Ill., and was educated at Rose Polytechnic Institute, where he graduated in 1923. He entered railway service on January 21, 1925, as an assistant on engineer corps on the Pennsylvania at Terre Haute, Ind. On December 22, 1926, he was promoted to assistant supervisor on the Trenton division at Bordentown, N. J., and was transferred successively to the Maryland division at Chester, Pa., and to the Middle division at Tyrone, where he was located at the time of his recent promotion.

R. Double, roadmaster on the Chicago, Burlington & Quincy, with jurisdiction over the branches between Creston, Iowa, and Cumberland, and between Creston and Amazonia, Mo., has been appointed roadmaster of the main line of the Creston division between Creston and Pacific Junction, succeeding **P. J. Melody**, who has been transferred to Red Oak, Iowa, to succeed **A. C. Anderson**, who has been transferred to Creston to assume charge of Mr. Double's former territory. **C. Eggert**, roadmaster on the LaCrosse division, with headquarters at LaCrosse, has been transferred at his own request, to the Galesburg division, with headquarters at Galesburg, Ill., where he succeeds **G. L. Griggs, Jr.**, who has been placed in charge of the Galesburg to Peoria and Buda to Rushville branches, with headquarters as heretofore at Galesburg, to take the place of **C. H. Freed**, who, in turn, has been transferred to the LaCrosse division to succeed Mr. Eggert.

Bridge and Building

James Dobbie has been appointed bridge and building master on the Kettle Valley, with headquarters at Penticton, B. C.

E. E. Booth, superintendent and master mechanic of the Beaver, Meade & Englewood, with headquarters at Forgan, Okla., has been appointed superintendent of bridges, buildings and construction.

Water Service

A. B. Zumwalt has been appointed supervisor of pipe lines on the New Mexico division of the Southern Pacific, a newly created position, with headquarters at Carizozo, N. M. **Wesley M. Rose**, supervisor of water service, with headquarters at Sacramento, Cal., has retired after 32 years' service.

Purchasing and Stores

J. L. Nichols has been appointed stationery storekeeper of the Cleveland, Cincinnati, Chicago & St. Louis, with headquarters at Beech Grove, Ind., succeeding **W. A. Saffell**, who has been assigned to other duties.

R. T. Huson, roadmaster on the Kansas City Southern, with headquarters at Leesville, La., has been promoted to tie and timber agent, with headquarters at Kansas City, Mo.

Obituary

Dwight A. Riley, assistant engineer on the Baltimore & Ohio, with headquarters at Baltimore, Md., died suddenly in that city on February 2.

E. L. Sinclair, division engineer of the Iowa division of the Chicago, Milwaukee, St. Paul & Pacific, with headquarters at Marion, Iowa, died suddenly on February 28 as the result of cerebral hemorrhage.

Samuel Rea, president of the Pennsylvania at the time of his retirement on October 1, 1925, and an engineer by training and experience, died on March 24 at his home near Ardmore, Pa., a suburb of Philadelphia. Mr. Rea was born on September 21, 1855, at Hollidaysburg, Pa., and entered railway service on July 17, 1871, in the engineering department of the Pennsylvania, where he was engaged for two years in work on the Morrison's Cove, Williamsburg and Bloomfield branches. In 1874 and 1875, he was in the service of the Holiday Iron & Nail Company, then re-entering the engineering department of the Pennsylvania where for two years he was an assistant engineer in charge of the construction of the chain suspension bridge over the Monongahela river at Pittsburgh, Pa. He became an assistant engineer on the Pittsburgh & Lake Erie in 1877 and in 1879 was in charge of the construction of an extension of the Pittsburgh, West Virginia & Charleston (now a part of the Pennsylvania). In the latter part of the same year he was engineer in charge of surveys in Westmoreland County, Pa., and the revision and rebuilding of the Western Pennsylvania (now also a part of the Pennsylvania). In 1883 he was appointed principal assistant engineer of the Pennsylvania and in 1888 was further promoted to assistant to the second vice-president. Later in the latter year he became vice-president of the Maryland Central (now a part of the Maryland & Pennsylvania) and chief engineer of the Baltimore Belt (now a part of the Baltimore & Ohio). Mr. Rea was out of railway service from April, 1891, to May 25, 1892, when he returned to the Pennsylvania as assistant to the president. He was promoted to first assistant to the president on February 10, 1897, and on June 14, 1899, was elected fourth vice-president of the lines east of Pittsburgh, Pa., and Erie. By successive promotions he became first vice-president on March 24, 1909, and on May 8, 1912, he was made vice-president in direct charge of the New York tunnel and terminal improvements. Mr. Rea was elected president of the Pennsylvania Railroad on January 1, 1913, serving in that capacity on that road and its successor, the Pennsylvania System, until the time of his retirement from active duties on October 1, 1925.

Samuel Rea

Hugh Curry, who had been roadmaster of the Alabama & Vicksburg (now a part of the Illinois Central) for 42 years at the time of his retirement on June 2, 1926, died in a hospital at Meridian, Miss., on January 10, at the age of 74 years, following an attack of influenza.

L. W. Swan, supervisor of bridges and buildings on the Lehigh Valley, with headquarters at Easton, Pa., died on February 28 at Easton. **E. R. Wenner**, supervisor of bridges and buildings, with headquarters at Wilkes-Barre, Pa., died suddenly in the passenger station in that city on March 4, while on his way to attend the funeral of Mr. Swan.

William Bittler, superintendent of water stations on the Pennsylvania between Crestline, Ohio, and Chicago, at the time of his retirement nine years ago, died at Ft. Wayne, Ind., on February 26, at the age of 78 years. Mr. Bittler entered the service of the Pennsylvania in 1868 as a stonemason and in 1875 was placed in charge of the maintenance of water stations between Crestline and Chicago, which position he was holding at the time of his retirement.

C. H. Kluegel, chief engineer of the Oahu Railway & Land Company, with headquarters at Honolulu, Hawaii, died at the Queen's hospital in that city on January 10, after an extended illness. Mr. Kluegel was born on February 27, 1847, at Newburgh, Ohio, and was educated at Union College (Schenectady, N. Y.), where he graduated in 1867. After leaving college, he spent 20 years on the Pacific Coast on various engineering projects, which included the position of locating engineer on the Pacific line of the Mexican Central (now a part of the National Railways of Mexico) and similar work on the Northern Pacific, as well as the location, construction and maintenance of several smaller roads. He was appointed chief engineer of the Oahu Railway & Land Company, in October, 1888, and later was also chief engineer of the Hilo Railway.

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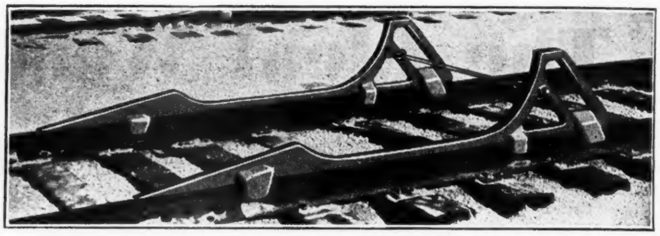

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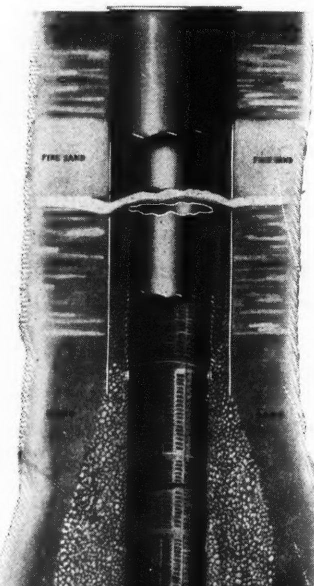

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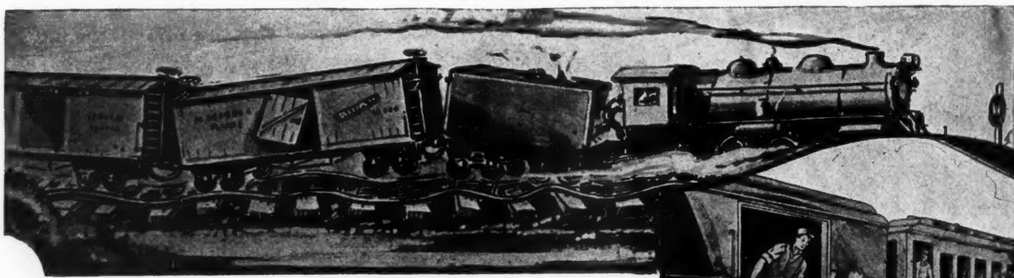


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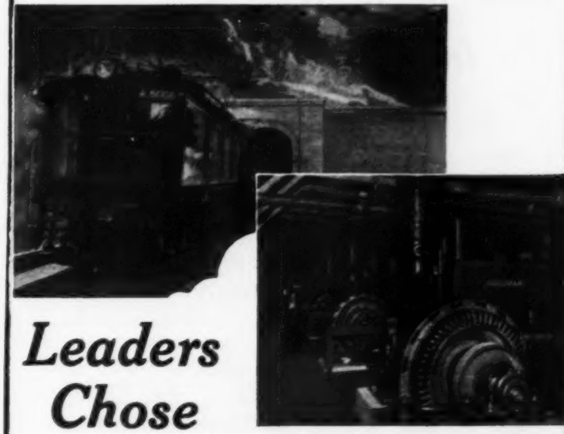

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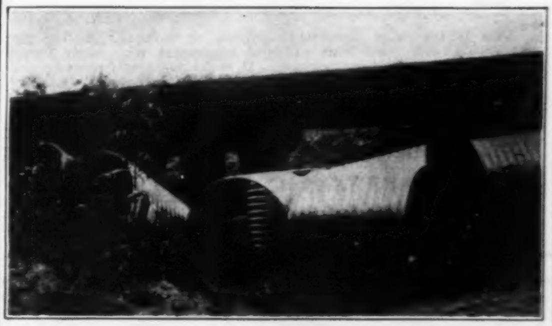

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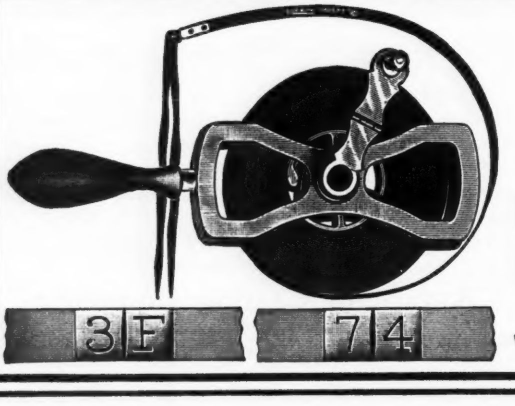

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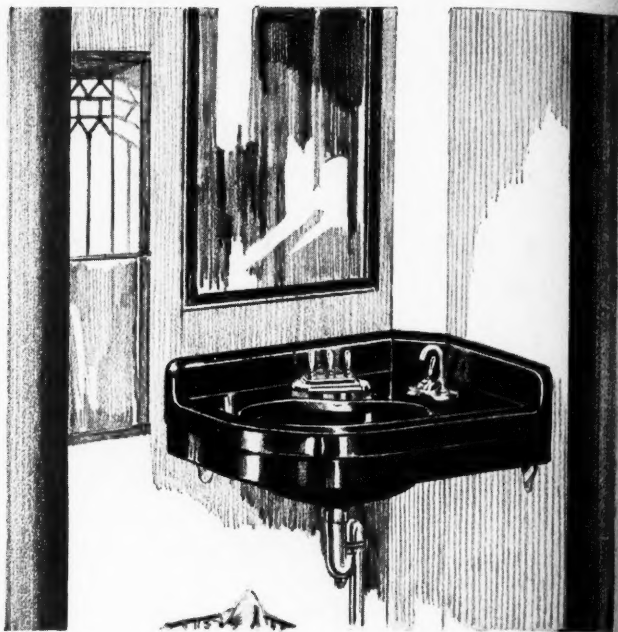

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